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EAST INDIA (SUGAR).

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COUNTERVAILING DUTIES IN INDIA.

CORRESPONDENCE AND ACT.

No. 1.

From the Government of India (Finance and Commerce Department) to the Secretary of State for India, No. 129, *dated Simla, 5th May,* 1898.

WE have the honour to forward copy of the papers regarding a proposal for the representation of India at the Conference on the sugar bounty question which is to be held at Brussels on the 7th June, 1898.

2. We approve the suggestions of the Bengal Chamber of Commerce that India should be represented at the Conference, if Her Majesty's Government have no objection, and that Mr. E. C. Ozanne, late a member of the Indian Civil Service, Bombay Establishment, should be sent to the Conference to represent India, and we request that arrangements may be made accordingly. Instructions for Mr. Ozanne's guidance will follow.

3. An examination of the statements in the note on the effect on the sugar-cane industry of India of the unrestricted importation of bounty-fed sugar, which forms one of the enclosures of this despatch, leads us to the conclusion that while the competition of imported sugar (of which three-fifths are cane sugar) may have reduced the profits of the refining industry, it does not appear to have materially affected the producer. He relies mainly on the demand for unrefined sugar, which constitutes seven-eighths of the trade, and in respect of these seven-eighths, there seems to be no reason to apprehend that the producer's profits have been lowered by the increased importation of beet sugar.

4. While, therefore, we adhere to the position stated in the Financial Despatches No. 33 of 14th February, 1888, and No. 145 of 14th May, 1889, and are prepared to press for the abolition of the sugar-bounties, and to join in an International Convention for that purpose, we are not prepared to levy countervailing duties on sugar imported into India as suggested by Messrs. Begg, Dunlop & Co., Turner, Morrison & Co., and Lyall, Marshall & Co., in their letter dated the 23rd February, 1898.

We have, &c.,
(Signed) ELGIN.
&c., &c.

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Enclosures in No. 1.

Enclosure No. 1.

From W. Parsons, Esq., Secretary to the Bengal Chamber of Commerce, to the Secretary to the Government of India, Finance and Commerce Department, No. 303, dated 1st March, 1898.

I am directed by the Committee of the Bengal Chamber of Commerce to enclose copy of a letter, dated 23rd February, from Messrs. Begg, Dunlop & Co., Messrs. Turner, Morrison & Co., and Messrs. Lyall, Marshall & Co., forwarding a note on the effect on the sugarcane industry of India of the unrestricted importation of bounty-fed sugar which is interfering seriously with the interests of native cultivators, zemindars, and manufacturers in this country, besides causing a loss of revenue to the Government of India.

2. The Committee in passing on this letter desire me to say that they support the suggestion made in the third paragraph that the Government of India should be asked to arrange by telegraph with the Secretary of State for the representation of India at the Conference on the sugar-bounty question which, it is understood, is to be held immediately at Brussels.

No. 2 (Enclosure in Enclosure No. 1).

From Messrs. Begg, Dunlop & Co., Turner, Morrison & Co., Lyall, Marshall & Co., to the Secretary to the Bengal Chamber of Commerce, dated 23rd February, 1898.

We send you the enclosed note on the effects of the unrestricted importation of bounty-fed sugar on the sugarcane industry of India, and would ask you to kindly lay the same before your Committee.

The accompanying note fully sets out how seriously the interests of the native cultivator and zemindar as well as those of the manufacturer are being affected, while the loss of revenue that must follow if the excessive importation of bounty-fed sugars continues, is of vital moment to Government. We trust your Committee will agree with us that the question is of sufficient importance to the country generally to enlist the Chamber's active support.

In the first instance we would request, if your Committee agrees with our views, that the Chamber should forward the note to the Government of India (Finance Department) urging them to arrange by telegraph with the Secretary of State for the representation of India at the Conference on the sugar-bounty question, which we understand is to be held immediately at Brussels, and that the representative should be instructed to press for the abolition of the bounty system and to inform the Conference that failing this the Government of India might in self-protection be compelled to institute countervailing duties.

As the Conference takes place at once, we trust the Chamber can see their way to approach Government without delay.

No. 3 (Enclosure in Enclosure No. 2).

Note on the effects of the unrestricted importation of Bounty-fed Sugar on the Sugarcane Industry of India.

Preamble.

The object of this Note is to present to the Government of India, for their consideration, facts and figures relating to the past and present position of the sugar industry in India, and to the effect upon it of European bounties for the protection of beet-sugar.

1. Broadly speaking, the sugar industry has passed through two phases and has entered upon a third. India was a sugar-exporting country at the beginning of the century. It became, in the course of years, a self-supplying country, more or less stripped of its exports. It is now fast taking the position of an importing country. The causes which led to the restriction of exports are explained in

storical accounts already in the possession of the Government of India, and are summed up in State Blue Books and in the Imperial Dictionary of Economic Products. Imports, when this last was written, had already begun to take the place of exports. And "they were drawn," writes the editor, "from the very countries which were formerly the chief consumers of our exports." But at that period—about 1890—the effect on the price of sugar in India and on home consumption had not become alarming. "So far," Dr. Watt remarks, "it may be safely affirmed that the loss of the markets to which India formerly exported sugar and the creation of a foreign supply have not told injuriously upon the production of sugar in India, notwithstanding that already India imports 3 cwts. for every cwt. exported." But the prospects of the future were regarded with great apprehension. "If," continues the article, "the Colonial sugar manufacturers were to produce an article competing in price with even the more expensive qualities of *gur*, the import trade would at once become of graver moment than it has yet assumed." That this critical period has been reached is the main fact which the present note is intended to illustrate.

2. That the foreign bounty system benefits Great Britain is well understood. It assists materially in the provision of a cheap breakfast table, and the whole population gains. But in India, a sugar-producing country, its effects are more complicated and very different. Consumers (of refined sugar) as in Great Britain, are, of course, *pro tanto* equally benefited, but these do not, as in Great Britain—and this is an important point—represent the whole community. On the other hand, the State, which does represent the whole community, must, as well as a very large section of the agricultural population, be very injuriously affected. For the importation of cheap sugar from abroad means the diminution of sugar production in India and that means, as will be shown, the lessening of the ability of the cultivator to pay rent, of the proprietor to pay land revenue, of the canal system to realise its rightful income, and of the manufacturer to compete against the foreigner. It means, in short, a future necessity to impose fresh taxes as a set off against the curtailment of land and water revenue, and this seems to be the ultimate calamity which has to be averted.

3. There is no statistical information available to show what percentage of the population is represented by habitual sugar consumers. But it is a well known fact, which could be easily confirmed by official enquiry, that sugar is not a necessity in the sense that salt is a necessity; that even in the crude form of *gur* or *jaggery* it is only enjoyed by the poorer classes as a luxury or as an occasional treat, and that it is habitually consumed only by the comparatively well-to-do classes. It is the latter, therefore, who are the chief gainers by the introduction of cheap sugar from abroad, and who, *per contra*, would be the chief losers by a tax upon the imported article. Whether, at the expense of the whole community, these classes should be benefited seems to be a main issue in this discussion.

4. The importance of cane cultivation in the agricultural scheme of almost every province in India is perhaps hardly appreciated, except by those officials whose duties have brought them into association with the settlement of land revenue. The remark may be found in many a settlement report that in such and such tracts the entire rent, and, therefore, the entire revenue is paid from the cane field. "The peasants say," writes the Settlement Officer of Bareilly, "that sugarcane is to other tillage as the elephant to other beasts." In almost every settlement report and district gazetteer of the Punjab, of the North-Western Provinces and Oudh, the extremely important position held by sugarcane in maintaining agricultural prosperity is prominently noticed, as the extracts quoted below sufficiently indicate.

PUNJAB.

Delhi—Sugar is the most important and profitable crop of the *kharif* harvest.

Gujranwalla—Is the most valuable crop of all for its acreage.

Ludhiana—The value is almost ten times that of an ordinary dry crop.

NORTH-WESTERN PROVINCES.

Azimgarh—Takes more of the time and labour of the Azimgarh cultivator than any other crop.

Benares—Is the principal agricultural product of the district.

Jaunpur—To which the enterprising cultivator devotes his greatest time, labour and capital.

Mirzapur—The most prized and profitable of crops.

(This list of quotations could be greatly amplified.)

5. Supposing that the assumption could for an instant be made that in our East Indian possessions sugar cultivation were to become as impossible, owing to foreign bounties, as it has become in our West Indian possessions, it is not too much to say that a large portion of our cultivators would be embarrassed or ruined, that many of the land proprietors would suffer the same fate, and that the State Exchequer would be seriously affected by the diminution of land revenue. It seems equally clear that a gradual restriction of the cane area must lead either to a gradual loss of land revenue, or what is from a financial point of view much the same thing, a hindrance to the normal growth of the State income from its land.

Dictionary of Economic Products, page 118—29 per cent. in the N.-W.P. in 40 years.

6. Statistical evidence indicates that although in recent years the expansion of the cane area has, though material, not been surprisingly large, yet that in canal-irrigated tracts it has been extremely great. It is not improbable, indeed, that the comparative cheapness of canal water has enabled India, as a whole, to struggle as it has against the attack of cheap foreign sugars. But at what cost to the State? Capital raised from the tax-payers and expended on canals has been and is being deprived of the return due to it. It may be true that the cheapness of canal water compared with that of water lifted from wells, has allowed the cultivators to make such large profits that both they and their landlords have been greatly enriched, and that it will enable them even probably to continue to hold their own against the sugar importer. But it is none the less true that their profits will decline as also their ability to pay rent and canal dues on their cane lands, if the price of sugar is permanently lowered.

7. While the cultivator, the landlord, the land revenue, and the canal revenue will thus be affected, the manufacturing interests of the country will also suffer. These, perhaps, are less important than those already dealt with—but they ought not to be ignored. The manufacture of better classes of sugar is a natural outlet for capital in a sugar-producing country, and is one, among many other investments, which tends to the employment of non-agricultural labour.

8. Nor must the fact be overlooked that the rise in the value of the rupee has been in recent years an important factor in the encouragement of foreign importations. As that rise has been mainly due to State action, so the remedy can only be found in action by the State. The value of the rupee has, since the closing of the Mints, been enhanced by something like 30 per cent., and the advantage has been to the foreign importer immediate and positive. To the cultivator of cane the advantage has been—if he has gained anything at all—indirect, but, as has often been argued, many years will lapse before the loss involved in a lower rupee price, so far as that lower price is due to an enhanced value of the rupee, will be equalised by lower rupee prices for labour and for household necessities. In the meantime the foreign importer will have had the opportunity to establish a position against him.

NOTE.

CANE CULTIVATION—AREA.

9. The Agricultural Statistics of British India show the area under cane for the official year 1895–96 as 2,930,583 acres; the average of the five preceding years was 2,863,803 acres; and the average for six years was 2,897,193 acres.

Outturn of Sugar.

10. Taking the outturn in "coarse sugar" to average one ton per acre,* an unduly low estimate according to Dr. Watt,† this represents an annual production of 2,897,193 tons, or, roughly, 79,000,000 maunds; and in addition there is a production from palm trees, given in the Resolution marginally noted above, as 150,000 tons, or about 4,100,000 maunds. Total production of coarse sugar in British India, 3,047,193 tons, or, say, 83,100,000 maunds.

Messrs. Thomson and Mylne,‡ in a Note to Government, dated 19th May, 1883, stated that the total production might probably be estimated at 5,000,000 tons.

Moreover, the Government Statistics exclude Central India and other important areas.

Consumption.

11. The consumption of sugar per head of the population,§ for all India, is put at 14 seers per annum by Dr. Watt, a moderate average, taking into consideration the fact that the Government standard per unit in the North-West Provinces and Oudh for octroi purposes has for years past been 33 seers, and that the actuals as regards some of the Municipalities are in excess of this quantity. The smaller factor of 14 seers per head consumption corresponds approximately with the estimated outturn of one ton per acre.

12. On the assumption that not more than two-thirds of the outturn enters into consumption as raw sugar, and valuing it at Rs. 3 per maund (the rate current at the moment for standard grades, say, Fyzabad and Azimgarh), this works out about Rs. 20,00,00,000.

13. Taking the remainder to pass through native refiners' hands and to yield 40 per cent. white crystallised sugar, worth, say, Rs. 10 per maund, the value of the production of refined sugar may be reckoned as Rs. 13,00,00,000.

14. Thus it is reasonable to compute that the cultivation of cane and sugar-yielding palms, and the allied industries of the manufacture and refining of sugar in British India, represent an aggregate annual turnover of at least Rs. 33,00,00,000. This estimate exceeds the figures given by Dr. Watt¶ in this connection, as a minimum, viz. :—£20,000,000.

Exports of Sugar from India.

15. Apart from the demand for internal consumption, India exports considerable quantities of raw sugar. The figures for the past ten years are given below :—

	Cwts.	Value. Rs.
1887-88	1,008,565	41,95,899
1888-89	978,955	50,69,771
1889-90	1,309,321	76,80,470
1890-91	795,973	37,91,871
1891-92	940,574	46,13,034
1892-93	798,773	45,42,721
1893-94	1,150,635	69,82,398
1894-95	958,107	47,10,804
1895-96	1,021,832	51,99,939
1896-97	1,097,202	62,22,644
Nine months to 31st December 1897 ...	507,361	21,69,786

Annual Statements of the Trade and Navigation of British India.

* Government of India Resolution on "The Sugar Cultivation and Production of India," dated 20th March, 1889, page 1.

† Dictionary of Economic Products of India, Vol. 6, Part 2, pages 116 and 346.

‡ Dictionary of Economic Products of India, Vol. 6, Part 2, page 120.

§ Dictionary of Economic Products of India, Vol. 6, Part 2, page 119.

¶ Dictionary of Economic Products, Vol. 6, Part 2, page 332.

16. These shipments are chiefly from Madras, and consist largely of date and other palm sugars. It will be seen that during the above term practically no ground has been gained.

17. Indian refined sugar constituted an export staple of some importance to the country up till 1877–78, the average for the five years ending with that period being 410,367 cwts., valued at Rs. 37,61,369. This trade, however, which might have been developed to high proportions, is now gone beyond recall, even if the sugar bounties in Europe were abolished. The average exports for the five years ending 1896–97 amounted to only 69,897 cwt., valued approximately at Rs. 8,97,364.

Imports of Foreign Sugar.

18. A certain quantity of refined sugar, chiefly of high grade, has been imported for decades past, but it is only of comparatively recent date, and especially within the last two and the current years that the competition of the bounty-fed beet variety has become a matter calling for serious consideration. The imports for the decennial period ending 1896–97 are as follows :—

		Beet.		Cane.	
		Cwts.	Value.	Cwts.	Value.
			Rs.		Rs.
Annual Statements of the Trade and Navigation of British India.	1887–88	12,606	1,49,577	1,702,396	2,06,53,783
	1888-89	2,355	40,125	1,448,126	1,73,72,518
	1889–90	51,297	6,68,927	1,572,324	2,10,22,120
	1890–91	774,969	92,23,609	1,959,522	2,40,44,887
	1891–92	280,620	34,03,573	1,788,365	2,17,64,461
	1892–93	285,910	41,30,445	1,562,006	2,17,87,715
	1893–94	201,408	29,48,116	1,829,846	2,50,32,514
	1894–95	282,213	35,54,691	2,013,980	2,48,04,909
	1895–96	724.649	88,38,442	1,800,325	2,18,10,913
	1896–97	880,375	1,01,47,134	1,802,088	2,09,72,047
Ditto for nine months ending 31st December 1897.	Nine months to 31st December 1897 ...	1,043,466	1,16,37,053	1,489,702	1,72,36,728

Review of the Trade of India in 1890–91, page 2.

19. The foregoing shows the enormous stride made by the State-protected commodity, and what makes the case still more striking is the fact that the expansion of beet imports has even in the earlier years been in the face of a steady fall in the gold value of the currency. These remarks are not to be taken as referring to the year 1890–91, which in this connection must be regarded as an exceptional year. It was then that the first great rush of beet sugar into the Indian Markets took place ; this, as Mr. O'Conor pointed out, being "the immediate and direct result of the system of sugar bounties, aided by the development of direct steam communication between India and Germany, and by the course of exchange." On the 9th April, 1890, exchange at Calcutta stood at 1*s.* $5\frac{3}{32}d.$, it rose rapidly, and by the 20th August had touched 1*s.* $8\frac{13}{16}d.$; at the end of that month the reaction set in, and at the close of the official year it had fallen to 1*s.* $5\frac{1}{8}d.$ The mean for 1890 and 1891 was 1*s.* $5\frac{3}{4}d.$, while for 1896-97 it may be taken at 1*s.* 3*d.*

Thus Imports, 1890-91...774,969 cwt. = Rs. 92,23,609 at 1*s.* $5\frac{3}{4}d.$
= £682,162-14-11$\frac{3}{4}$ p.cwt. = 17s. $7\frac{1}{2}d.$
Thus Imports, 1896-97...880,375 ,, = Rs. 1,01,47,134 at 1*s.* 3*d.*
= £634,195-17-6 p. cwt. = 14*s.* 5*d.*

facts that amply demonstrate the seriously adverse effect which the bounty system, *plus* any possible further rise in exchange, must have on Indian sugar cane cultivation.

20. At the present time (January 1898) with exchange at, say 1*s.* 4*d.*, there are sellers of "Beet," forward delivery, Bombay or Calcutta, at Rs. 7–8–0 per maund free of all charges.

21. The following passage which occurs in the 1889 Resolution is significant of the effect of these increasing imports of cane and beet sugars, and before these had attained anything like their present dimensions—as regards Bengal ; and may be taken to apply equally to other parts of India :—

Government of India Resolution of 20th March 1889.

> "These decreasing exports and increasing imports do not seem to augur well for the sugar-refining industry in Bengal, and they apparently confirm the statement made about 18 months ago by one of the leading dealers of Bengal in sugar. He asserted that the sugar export trade of Calcutta was declining ; that refinery after refinery in Bengal was being closed."

22. Official returns record the average value of imported refined sugar at the seaports for the past five years, as follows :—

Annual Statements of the Trade and Navigation of British India.

——	Per cwt.	Per maund.
	Rs. A. P.	Rs. A. P.
1892–93	14 0 5	10 4 3
1893–94	13 12 5	10 1 4
1894–95	12 5 8	9 0 9
1895–96	11 9 7	8 7 10
1896–97	11 9 7	8 7 10
For nine months ending 31st December 1897	11 6 4	8 5 6

On 4th January, 1898, in Calcutta, beet sugar was quoted at Rs. 8–1–0 per maund.

23. The cost of laying down this sugar from either Bombay or Calcutta at a central point in Upper India, say 700 miles inland, may be taken at between Re. 1 and Re. 1–2–0 per maund, including all charges.

24. Native refined sugar, in an ordinary year, varies in price according to quality from Rs. 7 to Rs. 16 per maund, and Rs. 10 per maund is a safe figure at which to assess the present average cost of its production.

25. The foregoing figures and remarks clearly confirm the conclusion as to the fate that must inevitably overtake the cane-growing industry of India, unless steps are promptly taken to avert it. It is an ascertained fact that at the present moment, the season when native refineries, as a rule, are going full swing, but few are being worked, the invariable explanation of the cause of inaction being that there is no profit margin between the cost of raw material and the price that can be obtained for refined sugar.

26. The subsidies granted by the European beet-producing nations to those engaged in the industry range as high as in the case of France, 4*s.* 6*d.* per cwt., or taking the sterling value of the rupee at 1*s.* 4*d.* = Rs. 3–6–0 per cwt., the result being that the Indian cultivator and refiner are practically handicapped to the extent of the bounties paid.

27. It is understood that a Conference on Sugar Bounties instituted by Belgium is to assemble in February or March at Brussels. It would, therefore, appear to be desirable to urge upon Government the necessity of endeavouring to secure the appointment of a special representative to the Conference to lay before it the facts of the case as regards India, and as the time is now short, Government might be asked to endeavour to arrange this by telegraph with the Secretary of State for India. Should the Conference of the representatives of the powers result in the removal of the State subsidies now paid by the European Continental powers, the necessity for any further action on the part of the Government of India would cease.

But it is felt that the most that can be hoped for is some modification of the subsidies now paid, and possibly the adoption of an uniform standard of bounty by Germany, France, and the other powers.

28. It seems futile to look for the total repeal of the bounties. Beet-growing is now recognised on the Continent as an almost indispensable factor in agricultural operations—an economic necessity. It forms a regular rotation of crops, and

offers great advantages apart from the sugar it yields. It provides cheap fodder, the pulp is largely utilised, and the cultivation and manufacture have been so much extended that they give employment to a great portion of the population whom it would be difficult to employ otherwise. It has, therefore, become a question of national importance to maintain and foster the beet industry as far as may be feasible. Taken in this light it would appear to be practically as dangerous for any Continental nation to discontinue these subsidies as for those interested in India to ignore the pressing necessity of taking immediate steps to neutralise their calamitous effect on a great agrarian industry.

29. In the event of the subsidies not being abolished, it is but just and reasonable that the Indian import duty on beet sugar be raised to a figure that would put an end to such an unnatural state of affairs. Further, that the amount of this duty should be determined on the basis of the higher rate paid in France, thus practically adopting "the most favoured nation" clause to meet the needs of the case.

30. In the speech recently made by Mr. Chamberlain at Liverpool, he is reported to have said that he had no objection to countervailing duties on the score that they infringed on freedom of trade :—

> "It would be perfectly justifiable to adopt that weapon in order to secure free trade in sugar; but this case of sugar was peculiar because the West Indian trade which we desire to save is a trade of 260,000 tons per annum, while the importation of sugar into this country is 1,500,000 tons per annum, and it does seem rather an awkward and unscientific way of benefiting a trade of 260,000 tons by interfering with a trade of 1,500,000 tons."

This has a distinct bearing on the matter under discussion. In India the position is exactly reversed, and therefore it would be logically both seemly and scientific in the interests of the majority, *i.e.*, the cultivator and the consumer of raw sugar, to tax the comparatively unimportant but well-to-do minority. Mr. Chamberlain proposes to give "a very large grant in aid of the West Indies;" it is not known whether he has like intentions in the case of the Mauritius, but it is in the power of the Home Government to give much more effective aid to that Dependency, by allowing India to tax alien sugar to the extent of the bounties granted by the European powers. All the sugar that Mauritius can produce (100,000 tons per annum) if sent to this country would not hurt, provided that the trade was worked on the basis of the cost of production, and it cannot exist long on any lower or less sound footing.

31. Were Government to propose to increase the tariff rates in respect of cane sugar, this might be considered objectionable, as detrimental to the interests of English manufacturers, the Mauritius, and other Imperial dependencies. But there is no desire to plead for more than a countervailing duty on beet in order that Indian cane sugar growers and refiners may be placed in a position to compete for the sugar supply required by the people of this country, on the actual basis of the cost of production. Given that this principle be accepted, there is every reason to believe that the industry would not only revive but expand; and that under favourable circumstances the native methods of treating the cane would steadily improve, there can be no question. The Behea Mill, now familiar in every sugar-producing tract, has accomplished much in this direction; more care and attention to the boiling, filtration, and straining of the juice has of late become noticeable in many places, a circumstance probably to be accounted for by the felt necessity of economising; while in some districts the use of the hand-centrifugal machine introduced by Messrs. Thomson & Mylne for separating the syrup from the sugar, has already effected an appreciable improvement in the class of sugar produced. In brief, what with natural advantages of climate, the frugal habits of the ryotwari classes who subsist by the cultivation and manufacture of sugar, enhanced as these favourable conditions are by increased irrigation facilities and the continuous opening out of fresh tracts of country to railway communication, it is unquestionable that the capabilities of the country in the production of sugar are, if not unduly handicapped as at present, susceptible of immense expansion. And that the introduction of improved methods and appliances in industrial occupations is becoming generally much more popular, is well

exemplified in the rapid development of cotton ginning and cotton pressing by steam power in the Punjab, the proprietors in the majority of cases being native produce dealers.

32. It has been admitted that a countervailing duty on beet sugar will increase the cost of the commodity to the consumer. But, apart from the fact that the Indian consumers of refined sugar of like class and quality are mainly the well-to-do classes, the imposition of a tax on a staple of consumption, in the manufacture of which is used an article that in theory is held, alike by the Hindu and Mussulman, to defile anything with which it comes into contact, would be welcomed rather than resented. To repeat our opening argument—in Great Britain, on the bounty question, the interest of the consumers as the great electorate over-rides every other consideration—and the sugar-refining industry there is practically dead. In India the position is reversed: the interest of the classes and masses with a stake in or dependent on agriculture and its concomitant industries, is paramount; these not only forming the great majority of the population (61 per cent. are dependent on agriculture alone), but contributing more than one-fourth of the Imperial revenue. And some idea may be formed of the relative economic importance of the mere cultivation of sugar from the fact that there is about as much land under it as under the great crops of indigo, tobacco and tea taken together.

33. "The ruin of the West Indies"—graphically described by Lord Pirbright in an article under this title in the December number of the *National Review*—has, as demonstrated by the report of the West India Commission, already been accomplished, and it is impossible to foretell where the mischievous results of the bounty system may end. As already pointed out, the Native refining industry has this season, to all intents and purposes, ceased in the North-Western Provinces and Oudh. This could hardly be otherwise, seeing that refiners would require to get raw sugar at a price that would not pay the cultivator, in order to compete with the bounty-fed article, superior in appearance to their productions, selling at Rs. 8 a maund. From a certain point of view the sugar-producing Colonies are in a stronger position; their industry is backed by a very large amount of capital, and large sums have been invested in machinery of the most approved modern type, while in India, the average Native refiner works on a very small scale, and with plant, if it can be dignified by such a term, and appliances of the most primitive description.

The following is a quotation from the Resolution on "the Sugar Cultivation and Production of India," dated 20th March 1889:—

34. "The Government considers that it may be said in general terms that the sugar industry of India is at the present day in a thriving condition, and that it has not been affected to any appreciable extent, like other sugar-producing countries, by the system of sugar bounties prevailing in Continental Europe. In the despatch of May 1882, the Government of India made the following remarks, which may be taken to apply equally to the present condition of the sugar industry of India:—

35. "The increasing import and the decreasing export do not, we consider, indicate the decadence of the industry in India. The area under sugar-cane has largely increased in Upper India through the development of canal irrigation and is reported to be extending from the same causes in Bombay. More sugar is produced in India than formerly; but the demand is much greater. Not only has the increasing prosperity of the people increased the average consumption, but sugar is now borne by rail into tracts where the cane is cultivated to a limited extent, and which were formerly very scantily supplied. The profitableness of the industry is seen in the high price which the Indian cultivator can obtain for his produce, and all the evidence before us leads to the belief that the capital invested in sugar cultivation in India is steadily increasing."

36. The rate of bounty has been largely increased by the Continental powers of Europe during the last two years, and on this and other grounds which have been indicated in the early paragraphs of this note, it is submitted that the conditions on which the foregoing Resolutions were based have entirely changed.

37. It cannot be denied that the sugar industry in India is in a state the reverse of thriving, and this as the direct result of the competition of imported bounty-fed sugar.

Foreign imports, which it was held in 1882 did not indicate any decadence of the industry in India, have, as the following statement shows, more than quadrupled since then. Besides the great extent to which Indian manufactured sugar has been thus displaced, the comparative rates at which the imports have been valued indicate the enormous fall in prices ($28\frac{1}{2}$ per cent.) brought about by the bounty system, with which the Indian producer has had to contend :—

—	Cwt.	Value Rs.	Value.	
			Per cwt.	Per maund.
1882–83	669,348	1,08,56,003	Rs. 16 3 6	Rs. 11 4 0
1896–97	2,682,463	3,11,19,181	„ 11 9 7	„ 8 7 10

38. A point is made in the Resolution of the area under sugar-cane having largely increased, but from the following figures it will be seen that the cultivation in recent years cannot be held to have extended on anything approaching the scale that might have been expected, in view of the growth of the general population, its more prosperous condition and greater purchasing power, the expansion of railway communication, and increased irrigation facilities.

	Acres.	
1888–89 1889–90	... ...	Figures for Bengal not available.
1890–91	 2,758,450	
1891–92	 3,100,232	
1892–93	 2,798,637	
1893–94	 2,897,042	
1894–95	 2,764,656	
1895–96	 2,930,583	

39. A matter which deserves notice is the income which might be derived from the imposition of a Rs. 3 per maund duty on imported beet sugar. Calculating such duty on the basis of the imports for 1896–97—and allowing the present 5 per cent. import duty to stand as a set-off against the cheaper freight by the subsidised shipping employed to carry sugar to India, and the preferential rates given by Continental railways on goods carried for export—this would represent about 36 lakhs. As a form of indirect taxation it would be little felt, particularly as in its incidence only the well-to-do classes who, as before stated, are the chief consumers of refined sugar, would be touched. On the other hand, if the impost had the desired effect of restricting imports the direct income thus estimated would be, it is hoped, considerably reduced. The real return to the State would be indirect, in the form of increased agricultural prosperity and enhanced returns from water and land revenues.

40. There is nothing radical or new in the proposals made in this note. The attached extracts from the Customs Tariffs now in force in Victoria and the Cape show that the necessity of countervailing duty on sugar manufactured from beet-root has been accepted by the Cape and Australian Colonies, while the satisfactory position of the home sugar-producing industry in these dependencies, in conjunction with the fact that, practically, the whole outturn of the Mauritius, 100,000 tons per annum, is divided between them and India, demonstrates clearly that the system adopted is a practicable, and in Imperial interests, a beneficial, means of counteracting the evil effects of the competition of bounty-fed sugar.

Extract from New Customs Tariff of Victoria, 1897.

The following is a statement of the duties now leviable on sugar imported into the Colony of Victoria :—

No.	Articles.	Rate of duty.
—	Sugar, not being produce of cane	12s. per cwt.
—	Sugar, produce of sugar-cane	6s. „ „

Extract from New Customs Tariff of Cape Colony, 1897.

An act to amend the Customs Union Tariff Act of 1889, brought into force on the 1st July, 1897. The following are the rates of duty to be levied on sugar imported :—

SCHEDULE A.

Class I.—Special Rates.

No.	Articles.	Rate.	£ s. d.
30	Sugar : (*a*) The produce of the cane (*not refined*), golden syrup, molasses, saccharum, and treacle.	Per 100 lbs.	0 3 6
	(*b*) Not cane, and all refined sugars...	„	0 5 0

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41. The Customs duty of ½ anna per gallon on kerosene, imposed in 1888 and in 1894, increased to 1 anna per gallon, has not had the effect of crippling the trade. Imports have more than doubled since the former date, as shown in the following statement :—

—	Gallons.	Value.
		Rs.
1887–88	30,200,042	1,21,68,173
1888–89	38,285,559	1,76,79,373
1889–90	51,839,400	2,38,66,839
1890–91	52,561,296	2,26,25,291
1891–92	55,508,063	2,20,09,659
1892–93	64,409,305	2,51,58,735
1893–94	83,611,938	3,09,15,261
1894–95	50,364,624	1,94,19,659
1895–96	63,312,422	2,77,97,430
1896–97	64,471,307	2,85,93,562

42. In 1896–97 these yielded to Government a gross revenue of Rs. 40,20, 343. In this connection it is not unreasonable to contend that, mineral oils having almost entirely taken the place of Indian vegetable oils for lighting and lubricating purposes, the trade has had a paralysing influence on oil-seed cultivation.

In spite of the development of canal irrigation, the increasing prosperity of the people, improved railway facilities, low freights, &c., the area under oil-seeds has remained practically stationary for the past five years, as borne out by the following figures :—

	Acres.
1891–92	12,854,358
1892–93	13,548,192
1893–94	14,815,951
1894–95	13,929,969
1895–96	12,844,062

while no expansion in the export of oil-seeds (although favoured by a low rate of exchange) has taken place that can be put as a set-off against the loss of the internal demand for vegetable oils for lighting, which, previous to the introduction of kerosene oil, was the sole luminant used by the people of the country ; the shipments to foreign countries for the past five years being :—

	Cwt.
1892–93	16,434,948
1893–94	24,153,353
1894–95	20,793,519
1895–96	13,585,071
1896–97	11,322,544

43. In conclusion, in the event of the Continental subsidies not being done away with, the measure proposed would free India from the injurious effects of a pernicious bounty system which has enabled beet sugar to dominate its markets, and threatens, in the interests of alien agricultural populations, not only to bring disaster and ruin on a large section of our own cultivating and industrial classes, but to add to the existing difficulties of the Government the most dangerous of all problems, an agrarian grievance, calculated to give rise to feelings of distrust and discontent, which once aroused might be difficult to allay.

Enclosure No. 4.

From The Honourable Mr. G. S. Forbes, I.C.S., Acting Secretary to the Government of Madras, Revenue Department, to the Secretary to the Government of India, Finance and Commerce Department. No. 1490, *dated* 28*th March*, 1898.

I am directed to forward the accompanying letter which has been forwarded to this Government for transmission to His Excellency the Governor General in Council, by the Chairman, Madras Chamber of Commerce, regarding the representation of India at the Conference to be held at Brussels on the Sugar Bounties Question.

No. 5 (Enclosure in Enclosure No. 4).

From The Honourable Mr. G. G. Arbuthnot, Chairman, Chamber of Commerce, Madras, to the Secretary to the Government of India, Finance and Commerce Department. Dated 19*th March*, 1898.

This Chamber has had the opportunity of perusing a copy of the letter from Messrs. Begg, Dunlop & Co., and other firms in Calcutta on the Sugar Bounties Question which was lately forwarded to the Government of India by the Bengal Chamber of Commerce, and it has the honour to state, in confirmation of its telegram of yesterday's date, that it gives hearty support to the suggestion made in the third paragraph of that letter, namely, that Government should

arrange by telegram with the Secretary of State for the representation of India at the Conference on the Sugar Bounty Question which it is understood is to be held immediately at Brussels.

This Chamber, moreover, considers that the representative of India should, in the words of the petitioning firms, " be instructed to press for the abolition of the bounty system, and to inform the Conference that failing this the Government of India might in self-defence be compelled to institute countervailing duties."

In the opinion of this Chamber, such a declaration of policy is imperative under the circumstances. Countervailing duties are India's only weapon of defence, and if her representative at the Conference is not allowed to use it, he will appear there as a mere suppliant for favour or pity—a rôle which is, as it seems to this Chamber, neither dignified nor calculated to facilitate an attainment of the object in view.

Enclosure No. 6.

From W. Parsons, Esq., Secretary, Bengal Chamber of Commerce, to the Secretary to the Government of India, Finance and Commerce Department. No. 503, 1898, *dated 7th April*, 1898.

In continuation of my letter No. 303, 1898, of 1st March, 1898, suggesting that the Government of India should be asked to arrange with the Secretary of State for the representation of India at the Conference on the Sugar Bounty Question which is to be held at Brussels, I am now directed by the Committee of the Bengal Chamber of Commerce to suggest that the name of Mr. E. C. Ozanne, Bombay Civil Service (Retired), and at present residing in Guernsey, should be submitted to the Secretary of State for India for the post referred to. The Committee understand that Mr. Ozanne is a good French scholar, which would be a distinct advantage at a Continental Conference, and that he was also deeply interested in the sugar question while in Bombay. As the Committee have been informed that the Conference has now been postponed until May, there will be ample time to communicate with Mr. Ozanne if the Government approve of the suggestion.

Enclosure No. 7.

Telegram from the Chairman, Chamber of Commerce, Madras, to the Secretary to the Government of India, Finance and Commerce Department. Dated 15th April, 1898.

This Chamber approves nomination of Mr. Ozanne as India's representative at the Brussels Sugar Bounties Conference, which it understands has also been approved by Bengal Chamber.

Enclosure No. 8.

From F. Stoker, Esq., Chief Secretary to the Government of North-Western Provinces and Oudh, to the Secretary to the Government of India, Finance and Commerce Department. No. 669, *dated 7th April*, 1898.

I am directed by the Lieutenant-Governor and Chief Commissioner to enclose copy of a letter, dated the 17th March, 1898, from the Secretary, Upper India Chamber of Commerce.

2. The Lieutenant-Governor has not otherwise had any reason to believe that the sugar-growing and manufacturing industries in these Provinces have yet been

seriously threatened by the importation of bounty-fed foreign sugar. But, in view of the large and important industry connected with the sugar growing in many districts of these Provinces, the matter appears to the Lieutenant-Governor one of sufficient importance to receive the attention of Government, and it will accordingly be kept under observation. In the meantime it appears to His Honour advisable, in the interests of these Provinces, that the country, if possible, be represented at the Conference referred to in the last paragraph of the enclosed letter.

No. 9 (Enclosure in Enclosure No. 8).

From W. B. Wishart, Esq., Secretary, Upper India Chamber of Commerce, Cawnpore, to the Chief Secretary to Government, North-Western Provinces and Oudh. No. 727 B., *dated* 17*th March*, 1898.

Under instructions from the Committee of this Chamber, I have the honour to submit, for the consideration of His Honour the Lieutenant-Governor of the North-Western Provinces and Chief Commissioner of Oudh, a letter received from the Bengal Chamber of Commerce, No. 372, dated 12th instant, with enclosures, dealing with the effect of the unrestricted importation of bounty-fed sugar on the sugar-cane industry of India.

2. That bounty-fed sugar has, in many places in these Provinces, taken, to a serious extent, the place of native-made refined sugar (*chini*) is undoubted; to quote alone the case of Cawnpore, which, indeed, is the only northern inland mart in which separate trade statistics are maintained, the sugar imports from Bombay and Calcutta for the past eight years are as follows:—

	From	
	Calcutta.	Bombay.
	Maunds.	Maunds.
1890	51,400	2,244
1891	58,569	2,418
1892	24,655	203
1893	16,771	6,424
1894	11,027	18,427
1895	1,750	9,126
1896	14,621	16,496
1897	21,612	131,728

Practically all the sugar sent up from the seaports is of foreign production, the bulk being beetroot.

3. The influence of these large imports upon the local industry is evidenced by the fact that the stock of beetroot sugar now in the Cawnpore *bazar* (some 50,000 maunds) is being offered at Rs. 8 per maund of 82 lbs. 2 ozs., whereas previously to the recent augmentation by the European Continental Powers of the rates of bounty, the price of the better classes of native refined sugar ranged from Rs. 11 to Rs. 16 per maund.

4. While the Chamber are not prepared to offer an opinion as to the precise effect which the influx of subsidized foreign sugars is likely to have on the agricultural and revenue interests of these Provinces, feeling that this is a question of which the Local Government is more qualified to judge than are members of the commercial community, they nevertheless are convinced that any material diminution of the cane area would be a serious blow to the cultivating population. The issue is of so great importance that they venture to ask that His Honour the Lieutenant-Governor would permit an opinion to be given to them as to whether it is likely that any equally lucrative crop could be found to take the place of cane in Upper India, so far as beet sugar may supplant cane in the markets for refined sugar.

5. My Committee agree with the Bengal Chamber as to the need for the representation of India at the Conference to be held at Brussels on the Sugar Bounties Question, and trust that His Honour the Lieutenant-Governor of the North-Western Provinces and Chief Commissioner of Oudh may see his way to address the Government of India in support of the representations made.

No. 2.

Despatch from the Secretary of State to the Governor General of India in Council. No. 149 (*Revenue*), *dated India Office, 25th August* 1898.

Copies of the Parliamentary Papers regarding the Sugar Bounties Conference at Brussels were forwarded by the mails of the 29th July and the 5th August. From those papers your Excellency's Government will have learnt that the Conference separated without achieving a definite result, that the Belgian Government will probably pursue the matter further, and that possibly the Conference may hereafter be convoked again. Meanwhile, entire freedom of action is reserved for Her Majesty's Government in regard to any measures which the development of the sugar question might render necessary.

2. I forward, for the information of your Government, the papers* noted in the margin. The letters from Mauritius urge that India should take steps to protect her own sugar and Mauritius cane sugar from the competition of bounty-fed beet sugar. At paragraph 4 of your Letter, No. 129 (Finance), dated the 5th May 1898, it was stated that you were not prepared to levy countervailing duties on bounty-fed sugar imported into India. I should be glad to receive more fully your views on this proposal, as Her Majesty's Government, now that they are in possession of the views of Foreign Governments, must consider during the next few months the course they should pursue.

*Extract from letter of Mr. Ozanne, the Indian Delegate, dated the 15th June 1898.
Extract from letter of ditto, dated the 18th June 1898.
Extract from letter of ditto, dated the 29th July 1898.
Letter from Colonial Office, dated 23rd July 1898.
Letter from Governor of Mauritius, dated 27th May 1898.
Letter from Chamber of Agriculture, Mauritius, dated 18th May 1898.

I have, &c.,
(Signed) GEORGE HAMILTON.

Enclosures in No. 2.

Enclosure No. 1 (Extract).

From E. C. Ozanne, Esq., to Revenue Secretary, India Office, dated Brussels, 15th June 1898.

It is clear that, except France, all the countries represented will be willing, if a Convention is arrived at, to abolish bounties. Belgium goes so far as to forgo the retention of her system of calculating a legal yield, and to accept the plan of manufacture and refining in bond, a point she refused to concede at the Conference in 1888. The position is simply this, that all attention is directed towards England. We were pressed very hard yesterday to say whether England (and of course India) is really determined to accept a penal clause in the Convention to be arranged. In our declaration we made use of vague expressions stating that England will be obliged to take some definite step to put a stop to the disturbance of the free course of trade and to the injury done to our Colonies and refiners by the artificial interference by foreign Powers, but we must go further, and instructions have been asked from Lord Salisbury.

We agree entirely with the view expressed by Lord Lytton in the Secretariat notes forwarded to me on 29th April 1898 that, "it is idle to strain "at the addition of an exclusive dealing clause. Without such a clause the "parties to the combination would be in a worse predicament than ever, &c." We cannot in any way hope for a Convention unless at least we say now that we are fully prepared to agree to a penal clause, such as Clause VII. of the draft Convention of 1888, as an essential element in the Convention. This is, as I am sure you will readily admit, a very different thing from making any declaration in the form of a threat or otherwise that we intend to impose a countervailing duty or to prohibit the import into England or India of bounty-fed sugar. We do not want to make any threat at all, but all the delegates show very unmistakeably their opinion that it is perfectly useless to proceed further till an assurance is given by England that we will be parties to the essential sanction of the Convention. It is on this point that instructions have been solicited, for by the orders of our deputation we were not given a free hand. Under my special instructions, based on the Despatch of the Viceroy, No. 145, of the 2nd May 1889, it seems to me that I have a freer hand than the other British Delegates, though of course I am strictly bound by Lord Salisbury's orders in so far as they restrict the orders of the Government of India. India can prohibit bounty-fed sugar under her present Customs regulations, without having recourse to legislation, and though the Government of India is not prepared to impose countervailing duties, it has not forbidden me to assert that it is prepared to prohibit the importation of sugar if such a step is forced on India by the action of foreign Powers. I conceive that if the British Government allows us to assent to a penal clause I am free to say that India will follow suit. If I have in any way misinterpreted my instructions I trust that you will be good enough to tell me so at as early a date as possible.

I may add that the indirect bounties given by France on production have the practical effect of a considerable bounty on exportation, though France has not admitted the fact. I may also add that the penal clause, if adopted, would undoubtedly leave the option of prohibition or countervailing duties, so that the instructions from India will be fully safeguarded.

Enclosure No. 2 (Extract).

From E. C. Ozanne, Esq., to Revenue Secretary, India Office, dated Brussels, 18th June 1898.

It is certain that the Conference will break up at once, if at the next meeting, fixed for the 24th, the British delegates are not empowered to consent to the insertion in an otherwise satisfactory Convention of a clause binding the States joining in the Convention, either to prohibit the importation of bounty-fed sugar, or to neutralize the bounty by a countervailing duty.

On the other hand, we have just received an important assurance from the President of the Conference that if England agrees to the penal clause, he will guarantee the accession of Belgium, Germany, Austria, and Holland. It is certain that neither France or Russia could afford to remain outside, and it is probable that they will readily join.

We have drawn up a paper, in which we endeavour to show reasons why England can hardly decline to accept the solution thus offered. I have no copy.

We are satisfied that the price of sugar will not rise above the average price of the last decade, if such an international agreement were arrived at. Nothing is more clear than that the price of sugar has been brought down in recent years by increased production rather than by a continuance of the bounties; though, of course, it is true that the increased production was induced in the first instance by the bounties—but the work of bounties is over. Their continuation can only work mischief, and this appears to be the universal feeling.

The Convention would not tend to cause a fall in production, but on the other hand would favour fair competition between cane and beet sugar, so as to supply fully the world's demand at a low price.

I need not discuss the fallacies underlying the popular cry of "cheap sugar," but there are reasons why cheap sugar is not desirable in India if it is obtained by artificial means. First, refined sugar is not a necessary in India, but, secondly, further cheapening, which must result from failure to secure the desired Convention, will necessarily greatly reduce the profits of cultivation, and the ability of the cultivator to meet canal charges, and ultimately injuriously affect the legitimate return to Government on the capital laid out on irrigation works.

(1.) India has lost its position as a sugar exporting country.

(2.) Its refining industry is at the point of extinction ; and

(3.) Its power to continue the cultivation of sugar-cane is seriously threatened.

The first result was due to the successful cultivation of beet as a sugar-producer, thereby enabling Continental countries to supply their own markets. The second followed the large imports of Mauritius sugar, diverted by the bounty-fed beet from European markets ; and the third result arises from the enormous imports of German and Austrian sugar into India.

If the Conference fails to secure a Convention a war of bounties must follow, sugar will be abnormally lowered in price, and sugar-cane will be driven out of cultivation.

Germany is probably aware that India requires some five million tons of sugar, and, being shut out of the American market by the countervailing duty recently imposed by the United States, will naturally do its utmost to displace local sugar in India.

Beet holds a place in the system of crop rotation in Europe which is analogous to that held, up to the present, by sugar-cane in India. Like beet, the sugar-cane possesses great advantages apart from the sugar it yields. I cannot imagine how the irrigated areas in India, watered as they are so largely by the great irrigation works constructed by Government, and the wells, dug with the help of taccavi loans from the Government Treasury, can substitute any crop which can profitably take the place of the sugar-cane.

There has been a struggle between Mauritius and German sugar. In 1895–96 the Mauritius seemed still able to hold its place, but more recent figures point to an immense advantage gained by Germany. In paragraph 18 of the note by Messrs. Begg, Dunlop, and other refiners, appended to the Despatch No. 129 of 1898, some figures are given. In "Capital" (19th May. 1898) more recent ones appear :—

Imports of sugar (value in rupees) :—

	Rs.
1896	26,72,000
1897	40,65,000
1898	58,16,000

In this paper the remark is made that "bounty-fed sugar continues to pour in in increasing volume," and the danger to local production is strongly forced on the attention of Government.

The cost of production of cane-sugar in the form of native refined sugar in India is estimated at Rs. 10 per maund. In January, 1898, in Calcutta, beet sugar was quoted at Rs. 8. 1. 0. It is not possible that the cost of production in India will diminish in proportion to the falling price of imported sugar, and the only result which is certain is that the profits of sugar-cane culture will continue to fall till displacement on a large scale will have to be faced.

The Government of India has power, by its Customs regulations, either to increase the duty on imported sugar or to prohibit it entirely. In both respects it has an advantage over the United Kingdom. There is no special

duty on sugar, and it is not probable that the Government of India will consider the question of imposing such a duty. India has assented to the principle of a Convention, stipulating only that it is not prepared to impose countervailing duties. If a Convention is arrived at by the Conference, the alternatives of prohibition and countervailing duties will be provided for, and it appears that the Secretary of State, by supporting the proposal of the British Delegates, which will be the subject of discussion at the Cabinet Council of Tuesday, to assent to a penal clause, will be able to secure a measure which will not only revive the refining industry in India, but will protect Government and the rayat from the very serious results of dislocation of the sugar-cane crop.

Germany is specially anxious for the Convention, and if it is arranged, Mauritius and German sugar will compete for the Indian market on equal terms. The desired result will be secured. India will receive from Germany and Mauritius all the sugar it requires at a price which will not be higher than the average price of recent years, and the sugar market will be safeguarded from violent fluctuations and uncertainty.

The British Government has committed itself to do its utmost to effect the abolition of bounties. It is obvious that a Convention can now be secured with all the European Powers, but an essential feature in the Convention, as a security to the contracting States, is the inclusion of a penal clause. Without such a clause no Convention can ever be arrived at for the suppression of bounties. In fact, any Convention without such a clause, as Lord Lytton said in 1889, would put the "parties to the combination in a worse predicament than ever. They would "themselves be precluded from fostering their own industry by means of bounties "while they would at the same time be at the mercy of the countries which "persevered in giving bounties."

In conclusion, I would quote a passage from the refiners' note (paragraph 45), which seems to show well and truly the probable effect of failure of the present Conference :—

> "In the event of the Continental subsidies not being done away with, the measure proposed would free India from the injurious effects of a pernicious bounty system which has enabled beet sugar to dominate its markets, and threatens, in the interests of alien agricultural populations, not only to bring disaster and ruin on a large section of our own cultivating and industrial classes, but to add to the existing difficulties of the Government the most dangerous of all problems, an agrarian grievance, calculated to give rise to feelings of distrust and discontent, which, once aroused, might be difficult to allay."

Enclosure No. 3 (Extract).

From E. C. Ozanne, Esq., to Revenue Secretary, India Office, dated 29th July 1898.

I shall, of course, be glad to write a report if you think it is expected of me, or that it would do any good.

But after all, the only point I could press on the Indian Government is the danger which India runs through an immense increase in the volume of imports of beet-root sugar. If this goes on, and it must go on if India does nothing, it seems to me clear that the sugar cultivation of India and the Mauritius will be most seriously and unjustly handicapped. If sugar-cane profits are reduced, the whole agriculture of India must be upset. I have, in the letters I wrote from Brussels, already urged the importance of this consideration.

The refiners, both in India and England, must be ruined if bounties continue. That is perfectly well known both at home and in India, and I fear that no words which I could use would have any effect.

If you think I should write a report, please let me know, but perhaps it may be better to await the results of the efforts Belgium is making now to bring about a compromise.

Enclosure No. 4.

From the Secretary of State for the Colonies to the Under Secretary of State for India. No. 14,347/98, *dated 23rd July* 1898.

I am directed by the Secretary of State for the Colonies to transmit to you, for the consideration of Lord George Hamilton with reference to the letter from this Department of the 26th May last, a copy of the Despatch on the subject of the establishment of countervailing duties on bounty-fed sugar imported into India.

I am, &c.,
(Signed) EDWARD WINGFIELD.

No. 5 (Enclosure in Enclosure No. 4).

From the Governor of Mauritius to the Secretary of State for the Colonies. No. 161, *dated 27th May* 1898.

Government House, Mauritius,

I have the honour to transmit to you a copy of a letter, with its enclosures, addressed to me by the President of the Chamber of Agriculture, the Honourable Dr. Edwards, communicating to me the following resolutions passed by the Chamber in support of representations made to the Government of India by the Chambers of Commerce of Bengal and Upper India on the question of the importation into India of bounty-fed sugar.

Resolved—

"That this Chamber is of opinion that great prejudice is caused to the staple industry of this Colony by the importation into India, our principal market, of bounty-fed beet-root sugar, upon the same terms as our unprotected product :

"That it is of the greatest importance that the admission of bounty-fed beet-root sugar into Indian markets should be discouraged :

"That the most effectual means of excluding bounty-fed sugar from Indian markets and putting an end to an unfair competition would be the imposition of a differential or countervailing duty, equal to the average amount of the bounty, upon all sugars upon which an export bounty has been paid, introduced into India :

"That it is desirable, therefore, to co-operate with the Chambers of Commerce of Bengal and Northern India, in urging upon the Imperial Government the immediate relief to the sugar industry of India, as well as that of this Colony, by the imposition of a differential duty, and also the great advantage which would be secured by the direct representation of the Indian Government at the Conference of the Powers convened at Brussels for June next :

"And that his Excellency the Governor be requested to transmit the substance of these resolutions to the Secretary of State for the Colonies by cable."

2. In accordance with the wish of the Chamber of Agriculture, I telegraphed to you the substance of these resolutions on the 21st instant.

3. You will observe from the correspondence that this course was adopted on the suggestion of the Upper India Chamber of Commerce that the representatives of the sugar industry in Mauritius should address the Home Authorities by telegram, urging the levy of a countervailing duty on beetroot sugar in India in the event of the Conference to be held in Brussels failing to bring about the total abolition of the Continental bounties.

4. I cannot doubt that the resolutions of the Chamber will receive your favourable consideration.

I have, &c.,
(Signed) CHARLES BRUCE,
Governor.

No. 6 (Enclosure in Enclosure No. 5).

18th May 1898.

I have the honour to inform you that at a meeting of the Chamber of Agriculture held on the 17th instant, the resolutions [quoted in Governor Bruce's letter above] were unanimously carried, on the motion of Mr. Frederick Nash, Vice-President, seconded by the Honourable Sir V. Naz, K.C.M.G.

I beg to remain, &c.,
(Signed) W. A. EDWARDS, M.D., President,
Chamber of Agriculture.

No. 3.

Despatch from the Secretary of State to the Governor General of India in Council, No. 23 (Revenue), dated India Office, 26th January 1899.

In my despatch No. 149, dated the 25th August 1898, I drew attention to the letters received from the Mauritius, urging that India should take steps to protect her own sugar and Mauritius cane sugar from the competition of bounty-fed beet sugar. And I asked for a fuller expression of the views of the Government of India on the matter, with reference to a remark in their letter of May 1898, that they were not prepared to impose countervailing duties on bounty-fed sugar imported into India.

2. Further papers received during the past few months do not give ground for anticipating an early result from the discussions at the Brussels Conference of last summer; and there appears little hope that, in present circumstances, France will materially alter her system of sugar bounties. Germany and Austria are the countries which chiefly send bounty-fed sugars to India; but nothing has occurred to show that Germany or Austria will abolish sugar bounties so long as France retains them.

3. I have recently received from the Colonial Office copy of a Memorial sent by 8,000 Mauritius planters and others to your Government in October 1898, praying that countervailing duties may be imposed on bounty-fed sugars imported into India. I forward copy of these papers.* It will be seen that Mr. Secretary Chamberlain apprehends that, in present circumstances, bounty-fed sugars will drive Mauritius sugar out of the Indian market, and will entail ruin and distress on a Colony where the majority of the population are Natives of India or their descendants, and that he requests that the memorial may receive the favourable consideration of Your Excellency's Government.

* Colonial Office letter of the 3rd January 1899.
Mauritius Governor's letter of the 12th November 1898.

4. In this request I concur, and I have no doubt but that you will take steps for dealing with this important matter at an early date. If, on reconsideration, you should see reasons for modifying the views expressed by the Government of India in May last, and for advising the levy of countervailing duties on bounty-fed sugars imported into India, the precise measures you would propose, either legislative or otherwise, should be clearly stated. I forward copy of a paper* which shows how countervailing duties on bounty-fed sugar are practically worked in the United States.

* Circular from the United States of America Treasury, dated 12th December 1898.

5. Whatever may be your final advice upon the matter, I shall give the fullest consideration to your views and to the grounds on which they may be based. I recognise the fact that the Indian aspect of this question may be different from that which it presents in this country, and I shall be prepared to attach much weight to the opinions held by the people of India regarding a fiscal change, such as has been suggested by the Colonial authorities.

6. Since the foregoing paragraphs were written, I have received a further letter from the Colonial Office, discussing the relations of sugar-growing British colonies to India, in the matter of coolie immigration and of the competition of bounty-fed sugars. A copy of that letter is enclosed. Regarding Mr. Secretary Chamberlain's suggestions for facilitating coolie emigration from India, I shall address you hereafter. I commend to your consideration his further remarks on the sugar bounties question. Your Government will doubtless consider the matter, chiefly and primarily, in the interests of the people of India; but, subject to this condition, any benefit which may be likely to accrue to the people of the Mauritius would be an additional argument in favour of the measures proposed.

I have, &c.,
(Signed) GEORGE HAMILTON.

Enclosures in No. 3.

Enclosure No. 1.

From the Secretary of State for the Colonies to the Under Secretary of State for India. No. 28,407/98, *dated 3rd January* 1899.

I am directed by Mr. Secretary Chamberlain to transmit to you, to be laid before Lord George Hamilton, a copy of a Despatch from the Governor of Mauritius, in which he encloses a petition* to the Governor-General of India signed by 8,000 planters and others connected with the sugar industry of Mauritius, praying that His Excellency may be pleased to impose a countervailing duty upon bounty-fed sugar imported into India, and to exempt from Customs duty sugar grown and manufactured in Mauritius.

2. Mr. Chamberlain concurs in the apprehension of the Memorialists that the continued sale of bounty-fed sugar will drive Mauritian sugar out of the Indian market, and will result in ruin and distress to a Colony the majority of whose population are natives of India or their descendants.

3. He therefore trusts that this petition may receive the favourable consideration of Lord George Hamilton and of His Excellency the Governor-General of India in Council.

I am, &c.,
(Signed) C. P. LUCAS.

No. 2 (Enclosure in Enclosure No. 1).

From the Governor of Mauritius to the Secretary of State for the Colonies. No. 400, *dated 12th November* 1898.

With reference to my Despatch, No. 399, of even date, transmitting to you a petition addressed to Her Majesty the Queen by nearly 8,000 planters, merchants, and others interested in the sugar industry in Mauritius, I have the honour to transmit to you a petition* addressed by the same petitioners to the Governor-General of India in Council, praying that His Excellency in Council may be pleased to grant that sugars duly proved to have been *bonâ fide* grown and manufactured in Mauritius may be exempted from the payment of Customs duty on their importation into India.

2. The prayer of the petition is similar to the prayer of a memorial of the Chamber of Agriculture, transmitted to the Marquess of Ripon by Mr. King Harman's Despatch, No. 158, of the 11th May, 1894. This petition was forwarded

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* Petition forwarded in original with the present Despatch (*vide* page 36 *post*).

to the India Office for transmission to the Government of India for favourable consideration by the Secretary of State. The Officer Administering the Government of Mauritius was informed by your predecessor's Despatch, No. 245, of the 26th September, 1894, that the Government of India considered that the memorial was not entitled to their "favourable consideration."

3. I venture to express a hope that the Government of India may be willing to reconsider the question, which is now supported by new and, as it seems to me, powerful arguments, and that in transmitting the enclosed petition you may be able to give it your support. In my Despatch, No. 273, of the 24th of August last, I pointed out to you the vital and ever-growing importance of the Indian market to this Colony, and I can conscientiously urge the claims of the petitioners to the most favourable consideration.

I have, &c.,
(Signed) CHARLES BRUCE,
Governor.

Enclosure No. 3.

Additional Duties on Sugar imported from, or the product of, Countries paying Bounties on the Export thereof.

1898.
Department Circular No. 199.
Division of Customs.

Treasury Department,
Office of the Secretary, Washington, D.C.,
12th December, 1898.

To Officers of the Customs and others concerned:

Section 5 of the Act of 24th July 1897 provides as follows:

That whenever any country, dependency, or colony shall pay or bestow, directly or indirectly, any bounty or grant upon the exportation of any article or merchandise from such country, dependency, or colony, and such article or merchandise is dutiable under the provisions of this Act, then upon the importation of any such article or merchandise into the United States, whether the same shall be imported directly from the country of production or otherwise, and whether such article or merchandise is imported in the same condition as when exported from the country of production or has been changed in condition by manufacture or otherwise, there shall be levied and paid in all such cases, in addition to the duties otherwise imposed by this Act, an additional duty equal to the net amount of such bounty or grant, however the same be paid or bestowed. The net amount of all such bounties or grants shall be from time to time ascertained, determined, and declared by the Secretary of the Treasury, who shall make all needful regulations for the identification of such articles and merchandise, and for the assessment and collection of such additional duties.

In pursuance of these provisions the following amounts of bounties respectively paid or bestowed, directly or indirectly, on the export of sugars by the countries hereinafter named, are hereby declared for the assessment of additional duties on sugars imported from, or the product of, such countries or their dependencies, viz. :—

ARGENTINE REPUBLIC.

On sugars produced in the country since 20th January, 1897, and exported with benefit of drawback, 6 centavos per kilogram.

AUSTRIA-HUNGARY.

On sugar under 93 per cent., and at least 88 per cent. polarization, 1·37 florins per 100 kilograms.

On sugar under 99½ per cent., and at least 93 per cent. polarization, 1·46 florins per 100 kilograms.

On sugar at least 99½ per cent. polarization, 2·10 florins per 100 kilograms.

Denmark.

On refined sugar, produced wholly from beets grown in Denmark, 1·12 crowns per 100 kilograms.

France.

Raw sugars of the standard of 65 to 98 per cent. for beet-root sugars, or of 65 to 97 per cent. for French colonial sugar, per 100 kilograms of refined sugar, 100 per cent., francs 10·82.

Sugar candies, calculated at their legal equivalent per 100 kilograms effective weight, francs 11·51.

Refined sugars in loaf or crushed, clear, hard, and dry, per 100 kilograms, effective weight, francs 11·51.

Raw and refined sugars in grains or crystals, of a minimum standard of 98 per cent., francs 11·17.

The output of refined sugar from raw is calculated by deducting from the polarization of the raw sugar twice the glucose, four times the ashes, and 1½ per cent. for loss in refining.

Germany.

On raw sugar at least 90 per cent. polarization and on refined sugar under 98 per cent., and at least 90 per cent., 2·50 marks per 100 kilograms.

On candy and sugar in white, hard loaves, blocks, crystals, &c., at least 99½ per cent., 3·55 marks per 100 kilograms.

On all other sugar at least 98 per cent., 3 marks per 100 kilograms.

The Netherlands.

On raw sugar produced in the country from beets, and testing less than 98 per cent., 2·2354 florins per 100 kilograms of hard refined (100 per cent.).

On raw beet sugars testing 98 per cent. or above, three-fourths of said bounty, viz., 1·7655 florins per 100 kilograms of hard refined.

On refined beet-root sugars, ·2946 florin per 100 kilograms of hard refined (100 per cent.) in addition to the above bounties.

On refined sugar from other materials than beet-root raw sugar produced in the country, ·2946 florin per 100 kilograms of hard refined.

The output of refined sugar from raw is computed by deducting from the polarization of the raw sugar twice the glucose, four times the ashes, and 1½ per cent. for loss in refining.

Russia.

On sugar testing not less than 99 per cent. per pood (36·113 pounds avoirdupois), ·50 rouble.

On sugar testing not less than 88 per cent. per pood, ·44 rouble.

On sugar testing not less than 75 per cent. per pood, ·38 rouble.

Every invoice of sugar must be accompanied by a certificate of the United States Consular Officer at the port of shipment to the United States, naming place

and country where the merchandise was produced, and, in the case of refined sugar, naming also the country of production of the raw sugar, molasses, or sirup used in the refining.

The liquidation of entries of sugar not accompanied by such certificates shall be suspended, and the estimated duties shall include an amount sufficient to cover the additional duty to which such sugar may be apparently liable.

The conversion of the several foreign currencies mentioned above into United States money will be governed by the provisions of Section 25 of the Act of 28th August 1894.

The question as to the net amounts of the bounties indirectly bestowed by the Government of Belgium on exported sugars is under consideration. Pending the ascertainment and determination of said amounts, entries of sugars imported from, or the product of, that country will be subject to the provisions of Circular No. 174, of 19th October 1897 (Synopsis 18,481).

(Signed) L. J. GAGE,
Secretary.

Enclosure No. 4.

*No. 667/99. Colonial Office, Downing Street,
Sir, 7th January 1899.

There are two questions affecting the prosperity of the sugar-growing colonies, on which correspondence has already passed between this Office and the India Office, and which Mr. Chamberlain would ask Lord George Hamilton to bring to the special notice of Lord Curzon of Kedleston, in order that they may receive his attention at the outset of his term of office.

The first is the subject of coolie emigration.* The second is that of bounties and countervailing duties.

* * * * * * *

But it seems not improbable that, however well supplied with East Indian labour the sugar planters may be, their industry may be destroyed if the bounty system continues unchecked, and, in the absence of countervailing duties or penal clauses, it is not easy to see from whence the check will come. On this subject Mr. Chamberlain can only express his own personal views as he has already expressed them in the House of Commons. There is, in his opinion, no valid economic argument against countervailing duties, and the question is purely one of policy and of expediency.

At first sight it would seem that it is obviously the duty of the mother country to take the first step in the matter, and that the other provinces of the Empire should follow the lead of the United Kingdom, but on this point the following considerations arise.

Till quite lately the one object of the bounty-giving nations has been to secure the sugar market of the United Kingdom itself. Of the sugar-growing British colonies, the West Indies alone have at any time within the last quarter of a century to any appreciable extent supplied the home market. The West Indies alone were therefore directly affected by the bounty system, though that system no doubt damaged the credit of the sugar industry in all parts of the world.

But, geographically, the natural market for West Indian sugar is not the United Kingdom but the United States, and for the time being a countervailing duty is being levied on bounty-fed sugar by the Government of the United States, so that at the moment West Indian sugar finds its natural price in its natural market, and would not gain directly—though no doubt the indirect gain might be large—by the imposition of a countervailing duty in this country. To

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* Paragraphs relating to coolie emigration omitted.

any proposal, therefore, to impose such a duty there was, and still is, an obvious rejoinder to be used with effect by those who, on political or other grounds, view with disfavour the case of the sugar producers.

Meanwhile, of late, bounty-fed sugar has found its way into India, and the Mauritius planters to the full, and to some extent the planters of Province Wellesley, are feeling the result of this State-aided competition in what is to them the natural market, and, as Lord George Hamilton is aware, a numerously signed petition on the subject from Mauritius to the Government of India has already been sent on to the India Office.

In the case of the United Kingdom it may be argued, and it is argued, that the imposition of a countervailing duty would raise the price of sugar in the interests of a few members of the capitalist class. This argument Mr. Chamberlain does not accept, and, were the West Indian Colonies dependent on the British market, he would be at pains to rebut it on their behalf, but in any case such an argument is obviously inapplicable in regard to the relations of Mauritius and India.

In this instance the actual workers are East Indians, and a community in which the East Indian element, as already shown, very largely preponderates, and of whose exports sugar represents about 98 per cent., is being brought within measurable distance of ruin by being undersold in India by bounty-fed beet sugar.

Writing on the 3rd of November last, the Acting Governor of the Straits Settlements observed that :—

> "The invasion of the Eastern markets by European sugar sold under cost price threatens to interfere with the best markets for locally grown sugar, and it is very much to be desired in the interest of this Colony and of the Protected Native States, in which considerable capital is being expended in sugar cultivation, that the bounty system should come to an end at an early date."

That these views are shared in India itself Mr. Chamberlain gathers from the representations which he understands have been made by the Bengal Chamber of Commerce.

He does not presume to suggest to the Government of India what course should be taken in the matter, but he would ask that their most earnest attention should be given to it. He has more than once declined to allow Colonial policy on commercial questions to be tied by the policy for the time being of the mother country, and if the Indian Government, in the interests of East Indians, were to see fit to penalise or to countervail bounty-fed sugar, or to give preference to the honestly grown cane sugar of the British Colonies, he would welcome the step as likely to strengthen the opposition to bounties and to hasten the collapse of a mischievous and unsound device for ruining an important British industry.

He would ask that a copy of this letter may be sent to the Governor-General in Council, with such support as Lord George Hamilton may see fit to give it.

I am, &c.,
(Signed) C. P. LUCAS.

The Under Secretary of State
for India.

No. 4.

From the Government of India (Finance and Commerce Department) to the Secretary of State for India, No. 27, dated Calcutta, 26th January, 1899.

We have the honour to acknowledge the receipt of your Lordship's Despatch, No. 149 (Revenue), dated the 25th August, 1898, referring to paragraph 4 of our Financial Despatch, No. 129, of 5th May, 1898, and requesting to be furnished with a fuller expression of our views in regard to the proposed levy of countervailing duties on bounty-fed sugar imported into India.

2. The total imports of refined or crystallised sugar from Austria-Hungary and Germany into India during the last three years, as given in the Trade and Navigation accounts, are quoted in the margin. It may be assumed that the imports of sugar from these countries represent bounty-fed beet sugar, which is being diverted to India in consequence of the closing of the American market by countervailing duties. The striking increase in the imports dates only from 1897–98. Simultaneously with these imports from Germany and Austria-Hungary imports from Mauritius have continued on the scale of preceding years, and prices of imported sugars are at present much lower in this country than in the past. They compete in the up-country bazaars not only with the best kinds of native sugars, but also with the commoner kinds of native sugar, produced by a rudimentary system of refining. There is evidence that the profits of native sugar refiners have in consequence been considerably diminished, that they have had difficulty in disposing of their stocks, and that in some places refineries have been closed. How far these effects are likely to be permanent it is impossible to say. Enquiries have been initiated in our Department of Revenue and Agriculture, as the enclosed copy of letter will show, and they will be supplemented by enquiries into the prices of both refined and coarse sugar which will be undertaken by the Director-General of Statistics. With these data before us we shall hereafter be in a position to express a final, or, at any rate, a more confident opinion on the policy of imposing countervailing duties. Meanwhile, as Her Majesty's Government wish to determine within the next few months what course they should pursue, we indicate the general considerations by which we should be guided in arriving at a decision.

	1895-96.		1896-97.		1897-98.	
	Tons.	R.	Tons.	R.	Tons.	R.
Austria-Hungary.	246	63,582	5,775	13,13,792	47,287	1,04,45,039
Germany ...	35,910	87,50,225	37,940	87,57,394	60,165	1,27,88,053

3. We have already said that owing to low prices, which are popularly connected with the great increase in the imports from abroad, the sugar refining industry in India is at present unprosperous. Among the poorer classes there is a considerable consumption of unrefined sugar, and we are at present without evidence as to what extent, if any, the commoner kinds of refined sugars, whether of native manufacture or imported, are taking the place of unrefined sugar among those classes, or reducing its price. But the probabilities are that, if the imports from foreign countries continue to increase, the demand for, and the price of, unrefined sugar will be affected if it has not already been so. If this movement were carried beyond a certain point, it would result in the abandonment of the cultivation of sugar-cane and the substitution of some other crop on those lands on which the cultivation is now conducted least advantageously. It is possible that this might take place to an extent sufficient to affect the security of our land revenue or canal receipts, as lands irrigated from canals rank among those most advantageously situated for the purpose of sugar-cane cultivation. On this subject, reference may be made to a passage towards the end of Sir John Strachey's Financial Statement for 1877–78.

4. The direct discouragement of the manufacture of refined sugar, whether by European or native firms, would be a serious evil in itself. Within the last twenty years a great impulse has been given to the cultivation of sugar-cane by the introduction of improved sugar mills which enable the cultivators to extract more juice from the canes, and the number of sugar factories has increased greatly. We cannot but view with disapproval any influence which tends to discourage the growth of manufacturing industries in a purely agricultural country, and this is more especially the case when the manufacture works up the produce of a crop which State irrigation has rendered to a great extent independent of seasonal vicissitudes.

We have, &c.,
(Signed) CURZON OF KEDLESTON,
&c., &c.

Enclosure in No. 4.

From T. W. Holderness, Esq., C.S.I., Secretary to the Government of India, Department of Revenue and Agriculture, to the Secretaries to the Governments of Madras, Bombay, Bengal, the North-Western Provinces and Oudh, the Punjab, and Burma; of the Chief Commissioners to the Central Provinces, Assam, Coorg, and Ajmere; and to the Resident at Hyderabad. No. 15—48–3, *dated* 31*st October* 1898.

The Government of India are anxious to obtain information as to the effect which the increasing imports of refined sugar from Europe and from Mauritius into India have so far exercised, or are tending to exercise, on the market for, and the price of, Indian sugars, and thereby on the profits of sugar-cane cultivation in India. Statements have been made in newspapers and periodicals that this increasing import of sugar at very low prices under the stimulus of the competition between the produce of Mauritius and the bounty-aided sugars of Europe is injuring the sugar industry of India by lessening the internal demand for, and reducing the price of, Indian sugars; that it will result in sugar-cane being less and less grown in India, and in the impoverishment of the agriculturist in many places to the extent that the land revenue assessments and the canal revenues will be endangered.

The Government of India have no clear evidence before them that the increasing sugar imports have had, or are tending to, such serious consequences. The area under sugar-cane in the different provinces has not declined of late years, nor in recent revenue or settlement reports have any observations regarding the unprofitableness of the industry been noticed. The extent to which the refined sugars from abroad compete in the Indian markets with the coarse sugars ordinarily manufactured by native processes, and tend to supplant the latter, is uncertain. There is probably an increasing demand for sugar in India for domestic consumption and for spirit distilling and sweetmeat making, and as the sugar-cane area has not expanded of late years, it may be that the increasing imports have not been in excess of the necessary demand, and that the price of Indian sugars has, notwithstanding these imports, been maintained. Lastly, the question whether sugar prices in India have fallen in recent years is one on which it is difficult on existing materials to pronounce, owing to the many varieties of sugar sold in Indian markets, and the failure of the published price returns to clearly distinguish between them.

3. The subject, connected as it is with the sugar bounty question, appears to the Government of India to be of sufficient importance to be specially investigated, and I am to ask that, with the permission of the Governor in Council, / His Honour the Lieutenant-Governor, inquiries may be made as to the effect of the competition of imported sugars on the cultivation of sugar-cane in _____, on the profits of such cultivation, and on those of the sugar industry; also as to the possibility of any falling off in the land or canal revenues in consequence of the abandonment of sugar-cane cultivation. I am to ask that the results of the inquiry may be communicated to the Government of India.

4. A statement showing the imports of sugar into India during the last three years, as given in the Trade and Navigation Returns, is appended. According to the article on sugar in the *Dictionary of Economic Products* (Volume VI., page 346) the area under sugar-cane in India is about 2,500,000 acres, and the outturn, in coarse unrefined sugar, about 2,500,000 tons. The value of this crop at Rs. 100 a ton may approximately be put at Rs. 25,00,00,000. The value of the imports of sugar in 1897–98 is returned at Rs. 4,70,87,904. The imports of sugar thus bear a considerable proportion, as regards value, to the sugar production of the country.

Appendix to Enclosure.

Imports of Sugar into British India.

	Quantities.			Value.		
	Twelve months, 1st April to 31st March.			Twelve months, 1st April to 31st March.		
	1895–96.	1896–97.	1897–98.	1895–96.	1896–97.	1887–98.
	Tons.	Tons.	Tons.	Rs.	Rs.	Rs.
Sugar, refined or crystallised :—						
From Austria-Hungary	246	5,775	47,287	63,582	13,13,792	1,04,45,039
„ Germany ...	35,910	37,940	60,165	87,50,225	87,57,394	1,27,88,053
„ Mauritius ...	68,336	74,442	70,302	1,64,55,377	1,71,78,409	1,56,60,098
„ China	10,302	6,965	14,558	26,61,905	17,91,512	33,48,381
„ Java	5,499	4,872	7,024	13,13,980	9,92,558	17,54,857
„ Straits Settlements.	5,387	3,166	3,717	12,53,962	7,67,904	8,13,005
„ Other countries	564	960	8,703	1,50,324	3,17,612	22,78,471
Total ...	126,244	134,120	211,756	3,06,49,355	3,11,19,181	4,70,87,904
Sugar, unrefined :—						
Countries unspecified	10,299	8,946	18,661	4,18,776	3,99,110	7,56,864
Grand Total ...	136,543	143,066	230,417	3,10,68,131	3,15,18,291	4,78,44,768

No. 5.

From Secretary of State to Viceroy, 24th January 1899.

(Telegraphic.)

A despatch is being sent by next mail. It states that there is no reason to suppose that changes will be made in bounties given by Powers represented in Conference at Brussels. Secretary of State for Colonies, in forwarding a petition to Indian Government from Mauritius in favour of countervailing duties, states that under present conditions the Colony (where most of the people are of Indian origin or extraction) is likely to be ruined, and requests that the memorial may be favourably considered. In this request I agree, and consider that early steps should be taken to deal with this important subject. Should you now adopt views different from those of your letter of May 1898 and propose countervailing duties, I shall be ready to consider proposals fully. Recognising that circumstances of Great Britain and India differ, I shall ascribe great importance to views which people of India hold on this matter. I send for information circular showing how countervailing duties are levied in United States.

No. 6.

From Viceroy to Secretary of State, 1st February, 1899.

(Telegraphic.)

Your telegram of 24th January last. Sugar bounties. A despatch has been posted by last mail, in which, taking Indian standpoint and irrespectively of Imperial policy in relation to Colonies, we arrive at conclusions on the whole favourable to recommendation of Colonial Office. We considered it expedient to send it unaltered. Despatch points out that since 1897–98 imports of beet sugar from Austria and Germany show marked increase, imports from Mauritius remaining stable. The present market price of imported sugars is unusually low. They compete with native sugar, both refined and coarse, and diminish profits of native sugar refineries. We are inquiring how far these effects are likely to be permanent. If foreign imports increase, sugar-cane cultivation may be ultimately reduced, and revenue from land and canals affected. Generally, we disapprove of any influence tending to discourage growth of manufacturing industries. (Despatch ends.) On receipt of your despatch, sent in advance, we will give every consideration to the question of countervailing duties, and submit proposals without delay.

No. 7.

From Secretary of State to Viceroy, 24th February 1899.

(Telegraphic.)

My telegram of the 24th January. Desire to know if you propose to pass an Act this Session imposing countervailing duties.

No. 8.

From Viceroy to Secretary of State, 25th February 1899.

(Telegraphic.)

Your telegram of the 24th February. Sugar bounties. Propose to legislate at once on American model.

No. 9.

From Secretary of State to Viceroy, 1st March 1899.

(Telegraphic.)

Sugar duties. Suggested legislation approved by Her Majesty's Government. When will Indian Government's intention be announced ?

No. 10.

From Viceroy to Secretary of State, 3rd March 1899.

(Telegraphic.)

Your telegram of 1st March. Sugar duties. Bill for imposing duties on lines of American law will be brought forward on 10th March and published in newspapers on 13th March.

No. 11.

From Secretary of State to Viceroy, 11th March 1899.

Telegraphic.)

Sugar. Countervailing duties. On what day do you expect Bill to be passed ?

No. 12.

From Viceroy to Secretary of State, 14th March 1899.

(Telegraphic.)

Your telegram of the 11th March last. Hope to pass Bill on 20th March, but am considering whether, as regards pending contracts, its operation shall be postponed for about three weeks.

No. 13.

From Secretary of State to Viceroy, 18th March 1899.

(Telegraphic.)

Your telegram of 14th March. Sugar Duties Bill. Please telegraph as soon as you have given your assent. Also telegraph substance of principal clauses as finally passed.

No. 14.

From Viceroy to Secretary of State, 20th March 1899.

(Telegraphic.)

Your telegram of 18th March. Sugar duties. Bill passed Council to-day. It comes into force at once, and adds to section 8 of the Indian Tariff Act, 1894, the provision, that, where any country pays or bestows, directly or indirectly, any bounty or grant upon exportation therefrom of any article, and the article is chargeable with duty under Indian Tariff Act, then, upon importation of any such article into British India, whether the same is imported directly from the country of production or otherwise, and whether it is imported in the same condition as when exported from the country of production or has been changed in condition, by manufacture or otherwise, the Governor-General of India in Council may, by notification in " Gazette of India," impose additional tax equal to net amount of such bounty, or grant, however the same be paid or bestowed. Net amount of any such bounty, or grant, as aforesaid, shall be, from time to time, ascertained, determined and declared by the Governor-General of India in Council, and the Governor-General of India in Council may, by notification in " Gazette of India," make Rules for identification of such articles, and for assessment and collection of any additional tax imposed on importation thereof. This Act does not apply to any imported article, bill of lading for which was signed and given before commencement of this Act. Correspondence and Act, with debates in Legislative Council of the Governor-General, will follow by next mail.

COLLECTION OF INDIAN PAPERS (CORRESPONDENCE, ACT, AND DEBATES, REFERRED TO IN PRECEDING TELEGRAM OF 20th MARCH, No. 14).

No. 15.

From C. E. P. VansAgnew, Esq., Vice-Chairman, Chamber of Commerce, Madras, to the Secretary to the Government of India, Finance and Commerce Department. Dated 6th September 1898.

The Sugar Bounty Conference held at Brussels in June having failed to attain the object for which it was assembled, this Chamber feels bound to reiterate the opinion that it expressed in the last paragraph of its letter to you, dated the 19th March 1898, namely, that under such circumstances, "countervailing duties are India's only weapon of defence." The imposition of such duties, it may be remarked, would be in accordance with the views of the British Delegates who attended the Conference. (*Vide* their Report to the Marquess of Salisbury, dated Brussels, the 27th June 1898) :—

* * * * * * *

"It seems clear that in the circumstances there are at present but two methods of securing the suppression of the bounty system :—

"1. By coming to some arrangement for such modifications or limitations in the French and Russian systems as may be acceptable to the other sugar-producing States, in return for the suppression of their bounties ; and

"2. By the conclusion of a Convention between a certain number of the sugar-producing States providing for the total suppression of sugar-bounties within their dominions and engaging that they will either impose countervailing duties on, or prohibit the entry of bounty-fed sugar coming from States which cannot be induced to become parties to the Convention."

The first alternative having now been shown to be unattainable, it only remains for the second alternative to be acted upon. The Chamber would be glad to learn that the Government of India will take steps in this direction without delay.

No. 16.

From W. B. Wishart, Esq., Secretary to the Chamber of Commerce, Upper India, to the Secretary to the Government of India, Finance and Commerce Department. Dated 13th September 1898.

In terms of paragraph 4 of No. 136 T., dated 30th April 1895, and No. 137 T. of same date, I beg to send herewith copy of letter addressed by this Chamber to Government, North-Western Provinces and Oudh, regarding the effect of the unrestricted importation of bounty-fed sugar on the sugar-cane industry of India.

Enclosure in No. 16.

From W. B. Wishart, Esq., Secretary to the Chamber of Commerce, Upper India, to the Secretary to the Government of the North-West Provinces and Oudh, Financial Department. Dated 12th September 1898.

With reference to this Chamber's letter of the 17th March last and in connection with a further representation on the same subject from the Madras Chamber of Commerce, to the Government of India, Finance and Commerce Department, dated 6th instant, I am directed by the Committee of this Chamber to solicit that His Honour the Lieutenant-Governor and Chief Commissioner may

be pleased to see fit to urge upon the Government of India the pressing necessity of instituting without delay countervailing duties on all subsidised sugar imported into the country.

As pointed out by the Madras Chamber, the Conference held at Brussels having failed in its object, the levy of countervailing duties now constitute India's only weapon of defence. This fact is emphasized in the report submitted to Secretary of State by the Brussels Delegates present at the Conference, *vide* the following extract therefrom :—

> "The market of the United States is already rendered unprofitable by this means (countervailing duties) to all bounty-fed sugar. All the Continental sugar-producing States, by means of customs duties and internal legislation, reserve the entire supply of the home market to the home producer of sugar; and the English, *and to a rapidly increasing extent the Indian, market thus becomes essential for the surplus production of the European countries.* Any steps by which these markets might be closed to bounty-fed sugar must therefore have a decisive effect in securing the speedy abolition of the bounty system."
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> * * * * * * *
>
> "If no solution can be obtained, it is possible that a still worse state of affairs may result by the increase of bounties in various countries."

That the sugar-refining industry in India must perish at a very early date, unless protected against the unfair competition which it has now to face, is unquestionable, but were further evidence needed as to this fact the attached statement, extracted from the official "Accounts relating to the Trade and Navigation of British India" should suffice. This shows that in 1888-89 the value of sugar imported amounted approximately to $1\frac{3}{4}$ crores of rupees and that of "All other articles of food and drink" to about $5\frac{3}{4}$ crores ; further, during the ten years under review the increase in sugar imported has gone on without interruption till it has reached $4\frac{3}{4}$ crores, while the value annually of "All other articles of food and drink" imported has remained practically stationary, the greatest variation being a minimum of approximately $5\frac{1}{3}$ crores worth in 1890-91 as against 6 crores in 1897-98.

Dated 12th September 1898.

Extract from Accounts relating to the Trade and Navigation of British India.

	Imports—Foreign Trade.		
	Sugar. Value in Rupees.	All other Articles of Food and Drink. Value in Rupees.	Percentage of Value of Sugar to that of all other Articles of Food and Drink.
1888–89	1,74,12,643	5,72,78,219	30 per cent.
1889–90	1,16,91,047	5,69,67,296	38 „
1890–91	3,32,68,482	5,30,42,719	63 „
1891–92	2,51,68,034	5,65,99,933	44 „
1892–93	2,59,18,160	5,35,90,026	48 „
1893–94	2,79,80,630	5,85,96,890	48 „
1894–95	2,83,59,600	5,55,06,200	51 „
1895–96	3,06,49,366	5,62,27,639	54 „
1896–97	3,11,19,181	5,73,69,712	54 „
1897–98	4,70,87,904	6,03,20,221	78 „

No. 17.

From W. B. Wishart, Esq., Secretary to the Chamber of Commerce, Upper India, to the Secretary to the Government of India, Finance and Commerce Department. Dated 17th September 1898.

In accordance with paragraph 4 of G.O. No. 136 T., dated 30th April 1895, and No. 137 T. of same date, I am directed to submit, herewith, copy of a supplementary letter, dated 16th instant, addressed by this Chamber to the Government of the North-Western Provinces and Oudh, in connection with the effect of the unrestricted importation of bounty-fed sugar on the sugar-cane industry of India.

Enclosure in No. 17.

From W. B. Wishart, Esq., Secretary, Chamber of Commerce, Upper India, to the Secretary to the Government of the N.-W.P. and Oudh, Financial Department. Dated 16th September 1898.

In continuation of this Chamber's letter of the 12th instant, I am directed to forward herewith a statement showing the relative quantities of refined sugar imported into, and exported from, Cawnpore from 1st January 1894 to 31st August 1898.*

From this it will be seen that the annual volume of the export trade has not fallen off, but that this fact is only due to the large and increasing extent to which imports into the town of native refined sugars are being displaced by those of foreign—mostly bounty-fed—sugars. The net average consumption of refined sugar in the municipality of Cawnpore is estimated at 10 seers per head per annum, but it is unnecessary to take this factor into consideration, as it does not represent, roughly speaking, more than the outturn of the local English refineries.

No. 18.

From His Excellency the Governor of Mauritius to His Excellency the Viceroy and Governor-General of India. No. 9390, dated 18th November 1898.

Referring to a semi-official despatch of my predecessor of the date of 12th July 1894, transmitting to you a copy of a memorial addressed to the Secretary of

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* This statement is not reproduced. The totals shown therein are as follows :—

	Imports into Cawnpore from					Exports from Cawnpore to				
	1894.	1895.	1896.	1897.	1898 (8 months).	1894.	1895.	1896.	1897.	1898 (8 months).
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
Calcutta ...	2,836	1,750	14,621	21,612	17,702	---	12	93	—	—
Bombay ...	18,427	9,126	16,496	131,728	107,474	120	154	2,268	11,827	7,173
All other Places ...	406,656	351,258	506,460	215,820	171,873	298,139	268,500	317,122	306,306	218,817

N.B.—Imports from Calcutta and Bombay consist almost entirely of foreign sugar, those from all other places almost entirely of native sugar.

State for the Colonies by the Chambers of Commerce and Agriculture of this Colony, praying that Mauritius sugar imported into India might be exempted from the tax of 5 per cent. recently levied by Your Excellency's Government, I have the honour to transmit a copy of a petition, addressed to Your Excellency in Council by the Chamber of Agriculture, in which they renew their request that sugars duly proved to have been *bonâ fide* grown and manufactured in Mauritius be exempted from the payment of Customs duty on their importation into India.

2. I have forwarded the original petition to the Secretary of State for the Colonies, for transmission to you through the India Office in the usual course, but I venture in the meanwhile to send you a copy in this semi-official way, and to express a hope that the prayer of the petitioners may be fortunate enough to secure the favourable consideration of your Government.

Enclosure in No. 18.

To His Excellency the Viceroy and Governor-General of India in Council.

The Humble Petition of the undersigned Planters, Merchants and others occupied and interested in the cultivation of sugar-canes and in the manufacture and sale of sugar in Mauritius,

Sheweth—

1. That the cultivation of sugar-cane and the manufacture and sale of cane sugar are practically the sole industries of the inhabitants of Mauritius, and that their welfare and even their livelihood depend upon the remunerative sale of the sugar produced.

2. That the sugar industry directly or indirectly gives employment and the means of subsistence to a population of about 380,000, of whom more than 260,000 are Indian immigrants or immediate descendants of natives of India.

3. That these Indian immigrants have come to Mauritius with the sanction and under the control and protection of the Imperial and the Indian Governments, secured by laws suggested, approved or imposed by both Governments, and that therefore the Imperial and Indian Governments are jointly responsible with the Government of Mauritius for the welfare and means of subsistence of themselves and their descendants.

4. That, in addition to the Indians and Indo-Mauritians employed on sugar estates under indenture or temporary verbal contract, a very important and yearly increasing proportion of Indian immigrants and of their descendants have purchased small landed properties which they cultivate chiefly in sugar-canes and also partly in vegetables and other agricultural produce.

5. That this class is already so numerous and important that it is estimated that between one-fourth and one-third of the total sugar crop of the Colony is produced from canes cultivated by them and sold by them to sugar factories, whilst a very considerable proportion of the vegetable food consumed by the Colony is also due to their industry.

6. That the system of peasant-proprietors strongly recommended by the West Indian Royal Commissioners, which the Imperial Government is trying to carry out, at great cost, in the West Indies, already exists and is extending in Mauritius; but so long as the price of sugar remains unremunerative, the advantages expected from the system cannot be obtained—as experience has proved that, owing to its distance from suitable markets, Mauritius cannot produce and export other articles than sugar.

7. That the principal outlet for the sugar produced by Mauritius is India, the more so as the much greater distance from European and American markets places it at a disadvantage when competing on those markets, even under conditions otherwise equal, against West Indian or South American sugars; and Mauritius has practically lost the markets of Australia, which some years ago took nearly one-half of its sugars, because Queensland and New Zealand, with the assistance of the money and the credit of their Government and of protective import duties, New South Wales and Fiji, which is close to Australia, are producing more sugar than the Australian consumption.

8. That rice and other cereal provisions, a large part of the chemicals for agricultural purposes, gunny bags for packing sugar and other articles used in connection with the manufacture of sugar are imported from India.

9. That the larger proportion of the export and import trade of Mauritius is thus carried on with India.

10. That in consequence of the export bounties given by foreign Governments, beet sugar can be sold below its cost price, and is competing with unfair advantage against the sugar of Mauritius on the markets of the world, and threatens not only to exclude Mauritius sugar from the Indian market, but to cause the rapid diminution and the possible ultimate extinction of the sugar industry in Mauritius.

11. That the loss of the Indian markets and the consequent large diminution and possible ultimate extinction of the sugar industry would entail great and growing misery and sufferings on the inhabitants of Mauritius and its large Indian population, and would throw a very heavy responsibility on the Imperial and Indian Governments.

12. That the large reduction in the sugar crop of Mauritius of last year caused by an exceptional drought and aggravated by the very low price of sugar—the high price of cereals during the Indian famine which has weighed heavily upon planters who have to feed their labourers and cattle—the plague in Bombay and Karachi which, for the third year, is seriously disturbing the sugar trade—have entailed upon the Colony in general and upon planters heavy losses which they cannot recoup so long as the price of sugar remains so low; and that Mauritius is in consequence suffering from serious financial difficulties and its public revenue is alarmingly decreasing.

13. That your Petitioners are convinced like the West Indian Royal Commissioners and the Right Honourable Mr. Joseph Chamberlain, Secretary of State for the Colonies, that the abolition of bounties would contribute to the revival of the sugar industry in the British Colonies and would help Mauritius to carry on the cultivation of the sugar-cane and the manufacture of sugar with less disadvantage, when competing, on fair terms, with beet sugar.

14. That failing the consent of Foreign Governments, the imposition of countervailing duties in India on sugars having received bounties, which was established last year by the United States of America, and which are now declared by Mr. Chamberlain and by many other high authorities to be in accordance with the true principles of free trade, would certainly lead to the speedy abolition of those bounties, and this conviction is shared by the British Delegates at the Brussels Conference.

15. That the Chambers of Commerce and of Agriculture of Upper India have, since the beginning of the present year, asked those engaged in the sugar industry in Mauritius to further the efforts which are being made against the bounty system, and to urge the levy of a countervailing duty on beet sugar in India, in the more than probable event of the Conference to be held at Brussels failing to bring about the total abolition of bounties.

Wherefore Your Petitioners humbly and earnestly pray that Your Excellency in Council may be pleased to take this petition into favourable consideration and

not allow the ruin of Mauritius and of its large Indian population to be accomplished by the continued competition of bounty-fed sugar, and they humbly beg strongly to support the prayer of the sugar producers in India, that, in the event of bounties not being abolished, the Indian Government may raise countervailing duties on the importation into India of all sugars having received bounties in the same manner as has been done by the United States of America.

(*a*) Your Petitioners further beg respectfully to submit that some time ago financial requirements induced the Indian Government to raise a Customs *ad valorem* duty of five per cent. on imports including sugars whether of British or of foreign origin.

(*b*) That the establishment of countervailing duties by the United States last year has diverted to the Indian markets a large proportion of the bounty-fed sugar excluded from America ; and the import of excessive quantities of such beet sugar into India renders the supply greater than the demand, and has the effect of lowering prices so much that the import duty which, under normal circumstances, would have been borne by the Indian consumer, practically falls heavily upon the Mauritius producer, who, receiving no direct or indirect assistance, cannot like his foreign competitors sell his produce below cost price, without incurring more or less heavy loss.

Wherefore Your Petitioners earnestly pray that Your Excellency in Council, in consideration of the exceptional fact that nearly three-fourths of the inhabitants of Mauritius are native-born Indians or immediate descendants of Indians, and that the larger proportion of the trade of Mauritius is with India,—be pleased to grant, by special favour, that sugars duly proved to have been *bonâ fide* grown and manufactured in Mauritius, be exempted from the payment of Customs duty on their importation into India.

The Indian Government need not fear that foreign sugars may be smuggled into India through Mauritius. In order to prevent such possible frauds, at the time when duties on foreign sugars existed in Great Britain, a high Customs duty was enacted on the import of all sugars in Mauritius. The enactment though useless now, as no sugar is imported into Mauritius, has not been repealed and is still in force, and that duty might be increased if the Government of India wished it.

We have, &c.,
W. A. EDWARD,
and others.

No. 19.

Telegram from the Secretary to the Government of the Punjab, Revenue Department, to the Secretary to the Government of India, Department of Revenue and Agriculture. No. 96, *dated 7th March* 1898.

Your No. 469. Imported sugar almost entirely superseding Indian refined sugar in towns, consequently great falling off in imports of refined sugar from North-Western Provinces, previously the chief source of supply. Native sugar refineries are also gradually being closed. In the Punjab cultivation, though not extending, has not fallen off, as the demand of the agricultural population, which is chiefly for unrefined sugar, is still sufficient to maintain prices at a level which renders cultivation profitable.*

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* The report of the Punjab Government, furnished in reply to the Government of India's circular of 31st October 1898, appears on page 58.

No. 20.

From J. W. P. Muir-Mackenzie, Esq., I.C.S., Secretary to the Government of Bombay, Revenue Department, to the Secretary to the Government of India, Department of Revenue and Agriculture. No. 1462, *dated* 23*rd February* 1899.

With reference to your letter No. 15—48—3, dated 31st October 1898, requesting that the Government of India may be furnished with information as to the effect which the increasing imports of refined sugar from Europe and from Mauritius into India have so far exercised, or are tending to exercise on the market for and the price of Indian sugars, and thereby on the profits of sugar-cane cultivation in India, I am directed to forward copies of the papers, specified in the margin, showing the results of the inquiries made by this Government on the subject.

Memorandum from the Survey Commissioner and Director of Land Records and Agriculture, No. 3658A., dated 10th December 1898, and its accompanying report of the Deputy Director of Agriculture, Bombay Presidency, No. 526, dated 5th idem.

Letter from the Chamber of Commerce, Bombay, dated 25th November 1898.

Letter from the Chamber of Commerce, Karachi, dated 6th December 1898.

Memorandum from the Commissioner of Customs, Salt, Opium, and Abkari, No. 750, dated 12th February 1899, and its accompanying report of the Collector of Land Revenue, Customs and Opium, Bombay.

2. The reports submitted by Messrs. Mollison and Morison show that the importations of European sugars during recent years were altogether abnormal, and that they neither lowered the price of Indian refined sugar consumed in the Bombay Presidency nor checked the cultivation of the cane, or the production of unrefined sugar to which practically the whole of the cane produced in the Presidency is devoted. On the other hand, the production of refined sugar in this Presidency is so far on too insignificant a scale to merit consideration. The two classes of sugar appeal to two very different classes of consumers and are used for more or less totally different purposes.

3. The Chambers of Commerce, Bombay and Karachi, are clearly of opinion that in the interest of trade countervailing duties against European sugar are uncalled for. It should, however, be remembered that the firms which constitute these Chambers are more or less connected with the trade in foreign (including Mauritius) sugar, either as shipping owners or agents, or as importers or agents for importers, whilst the trade in Indian sugar, whether Gul, refined or other, is in the hands of Native traders and middlemen.

4. On the whole, His Excellency the Governor in Council is of opinion that neither the commercial nor the agricultural interests of this Presidency are injuriously affected by the increasing imports of refined sugar, or call at present for the imposition of countervailing duties upon that part of the imported sugar, the export of which to this country is aided by bounties.

Enclosures in No. 20.

Enclosure No. 1.

From J. W. Mollison, Esq., Deputy Director of Agriculture, Bombay Presidency, to the Under-Secretary to the Government of Bombay, Revenue Department (through the Survey Commissioner and Director, Land Records and Agriculture, Poona). No. 526, *dated 5th December* 1898.

In reference to your No. 7340—123 Confidential, dated 16th November 1898, with accompanying papers, I have the honour to submit the following memorandum.

During the ten years ending 1897–98 there have been from year to year considerable variations in the sugar-cane area of the Presidency. The variations

are exhibited for each division in tabulated Statement A. In the first year of the decade the total area was most extensive. It dropped suddenly in the following year by nearly 25 per cent. It kept more or less at this standard for four years. It again rose suddenly in 1893–94, increased slightly in the following year, and rapidly declined up to 1897–98. In the Poona District, which is an important one, I believe that there has been a considerable extension of area in 1898–99, and that the total figures for the year 1898–99 for the Presidency when available will show a considerable rise over 1897–98.

In the eleven years up to 1898–99, I estimate that the total areas expanded abnormally in three years, dropped abnormally in one year, and showed only a moderate degree of variation in the other years. I cannot, from personal knowledge or from statistics at hand, show in definite terms the cause or causes of the variations in area. But I think it can be shown conclusively that foreign imports of refined sugar have had no influence in lowering the rates of Gul or on the area under cultivation. Areas have varied from year to year owing to the insufficiency of rainfall or water-supply, or on account of high and low prices for Gul ; and in the year of abnormally low area, 1897–98, the reduction was unquestionably due to extended cultivation of irrigated fodder and food-grain crops, consequent upon scarcity induced by famine in the previous year. In the famine year itself the reduction in area was not great, because the crop of that year was mostly planted before famine declared itself. The Deccan crop, which is much the most important one in the Presidency, is planted mostly between November and April. Sugar-cane needs much water, particularly during the hot weather. Cultivators know with certainty, at the time of planting, whether canal or well water is likely to be scant or sufficient during the following hot weather, and the sugar-cane area contracts or expands in accordance. If there is prospective deficient water-supply, other irrigated crops, taking four or five months from seed time to harvest, are substituted.

Table B exhibits Presidency imports and exports and the balance of sugar, refined and unrefined, for the ten years ending 1897–98. The balance of imports over exports represents quantities used in the Presidency in addition to indigenous productions. It will be noticed that the balance in the case of refined sugar has risen with a certain degree of steadiness from year to year, and it is important to determine why there should be a steadily increasing demand.

Gul (crude sugar), as produced in the Bombay Presidency by the native method of boiling, has for native cookery and for cheap sweetmeats a special value of its own and commands especially during the monsoon months retail rates which are often as high, or nearly as high, as the rates of the best refined imported sugars. It would be impossible to produce *profitably* from the Bombay sugar-cane crop refined sugar of superior class, even if treacle or other by-product could be utilized in the most profitable manner possible. Refineries at Poona and Gandivi (Baroda Territory), equipped with all modern appliances, have proved unprofitable undertakings. I dare say numerous reasons might be given for this. A conclusive reason, however is, that with average rates for Gul it is more profitable to make Gul than refined sugar. The indigenous native method of obtaining moist brown sugar from semi-liquid, not-fully-boiled, Gul by placing the Gul in large wicker baskets and allowing the treacle to drain away is still followed to a limited extent in the Presidency, but not nearly to the same extent as formerly. The moist sugar, when drained free of treacle, is exposed in the sun and trampled under the feet of coolies to dry it and separate the granules. There is a demand by ultra-orthodox Hindus for brown sugar made in this way, and the few shopkeepers, who sell it, charge higher rates for it than for imported Mauritius sugar of somewhat similar appearance—present rates for brown Mauritius sugar being Rs. 23–8–0 per palla of 120 seers (Poona seer equals 76 tolas), and for Kolhapur sugar Rs. 27 per palla.

The increasing foreign imports of refined sugar in the Bombay Presidency more than meet the diminished local production of moist sugar and the diminished rail imports from other parts of India. The increasing foreign imports of refined sugar, owing to cheapness and perhaps also owing to a higher standard of living

of an increased population, find extended use for household purposes and in the production of superior descriptions of sweetmeats. The habit of tea-drinking has extended to villages in out-districts, and there is no doubt that villagers who used sugar on rare occasions formerly now use it much more freely and oftener.

I quote as follows from a note prepared in the office of the Survey Commissioner and sent to me with statistical information :—

> "Imported refined sugar is largely used in the manufacture of sweetmeats. All milk sweetmeats, such as *pedhas*, *barphi*, *basundi*, and *shrikhand*, are made with refined sugar. Sugared parched-gram, cashew nuts and cardamom-seeds are all made with refined sugar, as also *bundi*, *jilbi*, and other finer kinds of sweetmeats. In all these sweetmeats imported refined Mauritius or beet sugar is used. The Kolhapur brown sugar and the Bengal soft white sugar (known as Benares sugar) have long been driven out of the market by the Mauritius sugars. At present imported beet sugar is preferred to the Mauritius sugar by the manufacturers of sweetmeats for the following reasons, and is sold at a slightly dearer rate:
>
> "(*a*) The packing of Mauritius sugar weighs about three seers, while allowance is made only for a seer and a half. The packing of beet sugar weighs one seer, and allowance is made for that weight.
>
> "(*b*) The beet sugar is brighter in appearance than the Mauritius sugar, and hence there is less loss in preparing *pank* or *bhura* from the former than from the latter.
>
> "In the manufacture of native sweetmeats sugar is hardly used without some preliminary process. It is used either in the form of *pank* or *bhura*. *Pank* is sugar clarified by boiling with water and inspissated. *Bhura* is *pank* dried and powdered with a wooden mallet. On the other hand beet sugar is not much esteemed by the middle class and rich natives. It is believed to lack sweetness and the blue tinge (or rather iridescence) is not liked. It is believed by the people to be due to the use of indigo in the process of refining. Soft white China sugar, called Dupeta, is much esteemed and it sells dearer by Rs. 3 to Rs. 5 per palla. The Mauritius sugars stand next in their estimation.
>
> "The sweetmeat manufacturers use Gul in the manufacture of inferior kinds of sweetmeats, such as *gudhani*, *revdis*, and *sabnya*. These sweetmeats command a large sale among poor classes, and are hawked about in streets and are kept for sale by every road-side sweetmeat seller. These sweetmeats are also made with sugar to suit more refined taste."

Turning again to table B, it will be seen that the balance of imports over exports in the case of unrefined sugar varies greatly from year to year. The Presidency needs in all years more Gul than it produces. If this table is compared with table A, which shows variations in area from year to year, it will be seen at once that in a year of diminished area and of diminished outturn the deficiency is made good by increased imports—the imports being chiefly rail-borne from other parts of India. In years of diminished area and diminished outturn in the Presidency the wholesale rates for Gul rise considerably, even at seasons when the markets are over-stocked (the whole produce of a district is sold by the producers in a period of three or four months), and these high rates no doubt induce imports from other parts of India when such are required.

The wholesale rates got by the producers, especially in the Poona District, where the area is large, are generally much less than those at which middlemen or dealers sell to the retail shopkeeper. Within the last three years, I have known Gul at Poona to vary in price from Rs. 10 to Rs. 24 per palla, and within a few days the price often rises or falls R. 1 or R. 2 per palla. These rapid variations are entirely due to speculation and combination amongst middlemen. The producer is forced to sell his Gul daily as he produces it, because he has no means of storage except for small quantities.

Table C exhibits variations in market prices of Gul and of refined sugar at important centres in each month for three years, 1895-96 to 1897-98. Refined sugar is cheapest, of course, in Bombay, and for obvious reasons dearest at Karwar. Unless in exceptional instances, there is little or no variation from month to month. The 1897-98 rates are cheapest, but are not much less than those of the other two years.

If the prices quoted for Gul are examined, great variations are apparent. The monsoon month rates are much the highest. This is partly due to difficulties in

storage and loss by drainage of treacle. The rates at other seasons vary, because of forced sales by cultivators and over-stocked markets. The diminished area in 1897-98 was responded to by a rise in prices in all districts. The Poona wholesale rates were in 1895-96 and 1896-97 generally unprofitably low, lower than in previous years; and if the low rates had continued, cultivation would have permanently decreased, because canal irrigation is more costly and manure much dearer than in out-districts.

The inferences that I draw from the variableness of the rates of Gul and the steadiness of rates for imported refined sugar are :—that the price of sugar has no effect on the price of Gul, and that foreign imports have yet had no effect on sugar-cane cultivation in the Presidency.

I quote again as follows from the note prepared in the Survey Commissioner's office :—

> "Gul has a distinct demand; it is considered to have a relish of its own, and is on that account used in certain dishes. It is also believed to be sweeter than sugar, and therefore it is cheaper to use it. It is also cheaper to use in cooking, because it requires a less quantity of ghee. Thus the variation in the price of refined sugar does not materially affect the price of Gul. This is well illustrated by the current prices of the brown Mauritius sugar and Gul. The rate for the former quoted a week ago was Rs. 23½, while that for the latter was Rs. 24 per palla.
>
> "Owing to the cheapening prices of sugar, it takes the place of Gul in such dishes as can take both Gul and refined sugar and where refined sugar was not used on account of its high prices; but such displacement of Gul is comparatively small. Cheapening of the prices of refined sugars has extended their use. Such sugared dishes as were beyond the means of poor people are now occasionally enjoyed by them."

Statistical information for Sind similar to that given for the Presidency is shown in tables A (1), B (1), C (1). As far as I can discern, the tabulated figures indicate that the imports of foreign refined sugars have in no way affected the price of Gul, the trade in Gul, or the area under sugar-cane cultivation. The sugar-cane area in Sind is small and the province chiefly depends for sugar on imports. The imports of refined sugar are mostly by sea, and such have trebled between 1888-89 and 1896-97. Imports of unrefined sugar are chiefly by rail, and show only trifling variations during the ten years ending 1897-98. The balance of import over export, *i.e.*, the amount retained or used in the Province, has in the case of refined and unrefined sugars varied considerably from year to year. The largest amount of refined sugar was retained in 1891-92. In the same year the least amount of unrefined sugar was retained. In 1893-94 the total quantity of refined sugar imported by sea was nearly all re-exported by rail. In this year heavy imports of unrefined sugar were mostly retained for use in the Province.

In the three years 1895-96 to 1897-98 the prices of refined sugar at important centres have, as in the Presidency, remained fairly steady from month to month, with a slight tendency towards lower prices in the last year. In the case of unrefined sugar, the rates have, as in the Presidency, been very variable from month to month, with a decided tendency to higher rates in the last year.

In paragraph 4 of Government of India Circular letter No. 15/48/3, Department of Revenue and Agriculture, dated 31st October, an estimate is made of the gross outturn of coarse unrefined sugar for India. The outturn is put at one ton per acre and the value at Rs. 100 per ton. This is an under estimate for the Bombay crop, both as regards outturn and value. A very ordinary crop of sugar-canes will yield two tons per acre of crude sugar, and that yield is considerably under average for this Presidency. Probably 3 tons per acre would be nearer the mark. A portion, however, of the Bombay crop is used for raw eating and not made into Gul. It should, I think, be noted that if Gul is worth less than Rs. 13 per palla wholesale, or, say, Rs. 120 per ton, crops producing less than 3 tons per acre would not be likely to be profitable in the Presidency; because the costs of cultivation are extremely heavy. Canal water in the Poona District costs Rs. 40 per acre. Irrigation by a lift from wells would be still more costly. The "sets" planted are worth Rs. 40 or 50 per acre. The item for manure is heaviest of all. A profitable application in the Poona District costs Rs. 150 or more per acre, but where available in out-districts would cost much less. The cost of tillage, harvesting and Gul-making will, in any district, exceed Rs. 100 per acre.

In concluding this memorandum, I think I ought to refer incidentally to the results of experiments in sugar-cane cultivation directed by the Agricultural Department, Bombay. These are fully described in Agricultural Ledger, No. 8 of 1898. The most important conclusions arrived at from these experiments are :—

(*a*) That there are superior and inferior varieties of cane in general cultivation, and that under suitable conditions the superior varieties might replace the inferior varieties, thereby increasing outturn without enhancing cost.

(*b*) That certain manures which are indigenous and within the means and reach of ordinary cultivators can be more profitably employed than those in ordinary use. Such can be used as substitutes or as auxiliary supplies, in either case increasing outturn and reducing cost.

(*c*) That the three-roller iron mill made by native firms in Poona is not only a labour-saving machine, as compared with other mills still extensively used, but is much more effective at work. On comparison with the time-honoured wooden mill the extraordinary fact was disclosed that the wooden mill left unexpressed juice, which the Poona mill could express, sufficient to yield 2,000 lbs. per acre of Gul in the case of a good crop.

(*d*) The experiments and enquiry further proved that superior methods of cultivation could in many places be adopted, that common methods of sugar-boiling can be improved, and that the Gujarat method of storing Gul in earthenware pots should be more general, thus enabling Gul to be stored without loss by drainage or otherwise and thus equalizing rates at all seasons.

I believe that the general application of the improvements suggested under (*a*), (*b*), (*c*), (*d*) would do more to advance the profitable cultivation of cane in India than any protection which a tax on imported sugar could afford.

No. 2 (Enclosure in Enclosure No. 1).

No. 3658 A., dated 10th December 1898.

Forwarded with compliments with reference to Government Memorandum, No. 7341—124 Confl., dated 16th ultimo, by the Acting Survey Commissioner and Director, Land Records and Agriculture, Poona, who expresses his general concurrence in the main results, and to intimate that the report required by Government Resolution, No. 7422, dated 19th idem, will be submitted when the information called for is received.

A.—*Statement showing Area in Acres under Sugar-cane in the Divisions of the Bombay Presidency.*

Division.	Years.									
	1888–89.	1889–90.	1890–91.	1891–92.	1892–93.	1893–94.	1894–95.	1895–96.	1896–97.	1897–98.
PRESIDENCY PROPER.										
Gujarat	11,788	6,787	7,571	9,894	9,767	10,914	10,298	8,754	7,949	7,439
Deccan	51,292	36,222	34,574	41,552	39,476	51,084	50,643	42,771	38,025	29,449
Karnatak	20,093	18,949	16,287	18,411	13,879	16,557	18,577	14,802	15,504	12,653
Konkan	5,631	5,775	4,853	5,265	4,921	4,902	5,082	4,828	4,700	4,519
TOTAL	88,804	67,733	63,285	75,122	68,043	83,457	84,600	71,155	66,178	54,060

B.—*Statement showing Presidency Imports, Exports and Balance of Sugar, refined and unrefined, for the ten years ending* 1897–98.

SUGAR REFINED.

Year.	Imports.				Exports.				Balance of Imports, column 5—column 9.
	By Rail.	By Coast.	By Sea.	Total.	By Rail.	By Coast.	By Sea.	Total.	
1	2	3	4	5	6	7	8	9	10
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
1888–89 ...	45,084	23,988	1,447,636	1,516,708	254,738	10,217	10,829	275,784	1,240,924
1889–90 ...	57,550	39,723	1,559,983	1,667,256	210,804	11,092	12,705	234,601	1,432,655
1890–91 ...	64,803	45,073	2,347,906	2,457,782	449,166	9,472	15,811	474,449	1,983,333
1891–92 ...	54,023	34,295	1,599,240	1,687,558	424,471	8,704	12,789	445,964	1,241,594
1892–93 ...	63,018	51,920	1,730,141	1,845,079	180,845	10,452	15,352	206,649	1,638,430
1893–94 ...	74,904	38,680	1,693,218	1,806,802	366,346	9,532	14,929	390,807	1,415,995
1894–95 ...	83,490	33,520	1,973,099	2,090,109	329,488	8,311	15,925	353,724	1,736,385
1895–96 ...	80,843	29,904	2,060,602	2,171,349	429,698	19,977	16,340	466,015	1,705,334
1896–97 ...	60,159	20,817	2,064,396	2,145,372	401,213	8,482	12,781	422,476	1,722,896
1897–98 ...	69,061	15,068	2,904,578	2,988,707	781,615	8,594	14,282	804,491	2,184,216

SUGAR UNREFINED.

1888–89 ...	310,457	7,331	...	317,788	105,075	28,025	26,423	159,523	158,265
1889–90 ...	385,016	12,080	4,980	402,076	134,429	20,816	18,197	173,442	228,634
1890–91 ...	930,129	116,193	4,247	1,050,569	132,379	12,179	18,738	163,296	887,273
1891–92 ...	710,975	1,245	4,451	716,671	112,842	15,400	28,412	156,654	560,017
1892–93 ...	773,396	63,961	2,224	839,581	98,109	17,275	22,343	137,727	701,855
1893–94 ...	704,868	43,397	2,939	751,204	115,463	14,749	19,378	149,590	601,614
1894–95 ...	299,283	9,647	1,972	310,902	195,995	26,103	28,661	250,759	60,143
1895–96 ...	391,472	27,919	4,064	423,455	176,284	15,604	41,283	233,171	190,284
1896–97 ...	426,528	34,488	1,548	462,564	182,515	13,765	31,161	227,441	235,123
1897–98 ...	513,780	39,122	8,000	560,902	136,120	9,593	17,217	162,930	397,972

C.—*Statement showing Maund Prices of Gul and Sugar for the official years of* 1895–96 *to* 1897–98.

District.		Sugar, Unrefined (Gul).																					
		April.			May.			June.			July.			August.			Sept.			October.			Nov.		
		R.	A.	P.	R.	A.	P.	R.	A.	P.	R.	A.	P.	R.	A.	P.	R.	A.	P.	R.	A.	P.	R.	A.	P.
Bombay	1895–96	6	5	7	5	13	7	5	11	5	5	11	5	5	12	7	6	1	6	5	11	5	5	11	5
	1896–97	5	11	5	5	11	5	5	11	5	5	11	5	5	11	5	6	2	3	6	5	7	7	2	3
	1897–98	7	2	3	7	6	0	8	2	7	8	2	7	8	2	7	8	2	7	8	2	7	8	2	7
Ahmedabad.	1895–96	6	2	6	6	3	5	6	8	6	6	10	8	6	10	8	7	0	6	7	4	4	7	4	4
	1896–97	5	14	10	6	3	5	7	0	6	7	8	6	8	0	0	8	0	0	8	8	6	10	0	0
	1897–98	8	3	3	8	14	3	8	14	3	8	14	3	9	8	3	9	4	5	10	12	10	10	5	2
Poona ...	1895–96	4	0	2	3	13	3	4	0	2	4	10	10	4	10	10	4	10	10	4	10	10	4	14	8
	1896–97	4	0	2	4	3	4	4	10	10	4	10	10	5	1	8	5	15	5	7	1	6	6	2	1
	1897–98	5	11	5	6	10	8	7	0	3	7	10	6	7	11	11	9	5	8	8	6	9	8	6	9

District.		Sugar, Unrefined (Gul).																					
		Dec.			Jan.			Feb.			March.													
		R.	A.	P.	R.	A.	P.	R.	A.	P.	R.	A.	P.										
Bombay	1895–96	5	11	5	5	11	5	5	11	5	5	11	5										
	1896–97	7	2	3	7	2	3	7	2	3	7	2	3										
	1897–98	8	2	7	7	9	11	7	14	1	8	2	7										
Ahmedabad.	1895–96	6	12	10	6	8	6	6	2	6	5	15	8										
	1896–97	10	0	0	9	11	2	9	6	7	8	7	8										
	1897–98	7	8	6	7	0	6	7	4	4	7	4	4										
Poona ...	1895–96	4	13	0	4	11	11	4	15	3	4	2	11										
	1896–97	5	13	9	5	12	11	5	2	4	5	1	0										
	1897–98	7	7	11	6	11	9	6	3	10	6	5	9										

District.		Sugar, Refined.																					
		April.			May.			June.			July.			August.			Sept.			October.			Nov.		
		R.	A.	P.	R.	A.	P.	R.	A.	P.	R.	A.	P.	R.	A.	P.	R.	A.	P.	R.	A.	P.	R.	A.	P.
Bombay	1895–96	9	8	5	9	8	5	9	8	5	9	8	5	9	8	5	9	8	9	9	8	5	9	8	5
	1896–97	9	8	5	9	8	5	9	8	5	9	8	5	9	8	5	9	8	5	9	8	5	9	8	5
	1897–98	9	8	5	8	12	8	9	7	0	8	12	8	8	12	8	8	12	8	8	12	8	8	12	8
Ahmedabad.	1895–96	11	13	8	11	0	7	11	6	10	11	6	10	11	13	8	11	2	1	11	6	10	11	6	10
	1896–97	11	6	10	11	15	9	12	0	6	11	6	10	11	6	10	11	6	10	11	6	10	11	0	7
	1897–98	10	0	0	10	1	6	11	0	6	10	10	8	10	5	2	10	7	5	11	2	10	10	10	8
Poona ...	1895–96	10	8	5	10	8	5	10	8	5	10	8	5	9	10	0	9	14	6	9	12	3	9	5	8
	1896–97	10	8	5	10	8	5	10	8	5	10	8	5	10	8	5	10	8	5	10	8	5	10	8	5
	1897–98	12	8	0	12	8	0	12	0	6	10	8	5	10	8	5	10	8	5	10	8	5	10	8	5

District.		Sugar, Refined.																					
		Dec.			Jan.			Feb.			March.													
		R.	A.	P.	R.	A.	P.	R.	A.	P.	R.	A.	P.										
Bombay	1895–96	9	8	5	9	8	5	9	8	5	9	8	5										
	1896–97	9	8	5	9	8	5	9	8	5	9	8	5										
	1897–98	8	12	8	8	12	8	8	12	8	8	10	6										
Ahmedabad.	1895–96	11	11	6	11	6	10	11	6	10	11	6	10										
	1896–97	10	5	2	10	9	6	10	2	6	10	0	0										
	1897–98	10	6	2	10	7	5	10	0	0	9	13	6										
Poona ...	1895–96	9	5	8	9	5	8	9	5	8	9	14	6										
	1896–97	10	8	5	10	8	5	10	8	5	11	6	10										
	1897–98	10	8	5	10	8	5	10	8	5	10	8	5										

A (1).—*Statement showing the Area in Acres under Sugar-cane in Sindh.*

—	Years.									
	1888-89.	1889-90.	1890-91.	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.	1897-98.
Sindh ...	3,477	2,895	2,532	3,034	3,119	3,502	3,319	3,483	3,180	2,832

B (1).—*Statement showing for Sindh Imports and Exports and Balance of Sugar, refined and unrefined, for the ten years ending* 1897-98.

Sugar, Refined.

Year.	Imports.				Exports.				Balance of Imports over Exports, column 5—column 9.
	By Rail.	By Coast.	By Sea.	Total.	By Rail.	By Coast.	By Sea.	Total.	
1	2	3	4	5	6	7	8	9	10
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
1888-89 ...	1,874	3,983	257,288	263,145	106,696	54	14	106,764	156,381
1889-90 ...	981	3,708	243,568	248,257	93,830	19	12	93,861	154,396
1890-91 ...	2,063	3,019	491,309	496,391	146,081	5	129	146,215	350,176
1891-92 ...	1,345	4,390	525,222	530,957	82,711	33	95	82,839	448,118
1892-93 ...	381	2,699	338,021	341,101	156,616	79	154	156,849	184,252
1893-94 ...	851	1,519	318,624	320,994	300,387	2,826	191	303,404	17,590
1894-95 ...	1,275	709	455,081	457,065	245,657	325	207	246,189	210,876
1895-96 ...	674	893	606,216	607,783	385,669	169	256	386,094	221,689
1896-97 ...	572	4,150	792,751	797,473	436,892	479	136	437,507	359,966
1897-98 ...	472	...	...	...	657,269	...	...	...	...

Sugar, Unrefined.

Year.	Imports.				Exports.				Balance of Imports over Exports, column 5—column 9.
	By Rail.	By Coast.	By Sea.	Total.	By Rail.	By Coast.	By Sea.	Total.	
1	2	3	4	5	6	7	8	9	10
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
1888-89 ...	254,354	15,875	240	270,469	31,172	553	89	31,814	238,655
1889-90 ...	251,813	14,116	473	266,402	3,040	702	192	3,934	262,468
1890-91 ...	279,380	8,854	20	288,254	118,706	2,770	289	121,765	166,489
1891-92 ...	268,987	9,441	158	278,586	231,755	306	430	232,491	46,095
1892-93 ...	279,298	10,575	372	290,245	2,462	376	294	3,132	287,113
1893-94 ...	340,761	12,690	142	353,593	2,529	187	309	3,025	350,568
1894-95 ...	290,500	22,483	95	313,078	3,120	257	159	3,536	309,542
1895-96 ...	285,082	15,313	241	300,636	175	425	212	812	299,824
1896-97 ...	223,671	14,895	98	238,664	4,203	189	279	4,671	233,993
1897-98 ...	181,923	...	...	...	11,793	...	...	...	...

C (1).—*Statement showing Maund Prices of Gul and Sugar for the official years of* 1895–96 *to* 1897–98.

DISTRICT.		SUGAR, UNREFINED (GUL).											
		April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	Jan.	Feb.	March.
		R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.
Karachi	1895-96	5 11 5	5 5 4	5 2 7	5 11 5	5 11 5	5 11 5	5 11 5	5 11 5	5 11 5	5 11 5	5 11 5	5 11 5
	1896-97	5 0 0	5 11 5	5 11 5	6 10 8	6 15 4	7 4 4	7 7 1	7 9 11	6 15 4	7 4 4	7 4 4	7 9 11
	1897-98	6 10 8	8 6 9	8 6 9	10 0 0	8 6 9	8 14 3	10 2 6	9 11 2	9 6 7	8 0 0	7 4 4	8 1 6

DISTRICT.		SUGAR, REFINED.											
		April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	Jan.	Feb.	March.
		R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.	R. A. P.
Karachi	1895-96	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0
	1896-97	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0	10 0 0	8 12 3	8 6 9	10 0 0	10 0 0
	1897-98	10 0 0	9 6 7	8 14 3	8 14 3	8 14 3	8 14 3	9 0 3	8 14 3	9 0 3	8 14 3	8 0 0	8 0 0

Enclosure No. 3.

From F. N. Paton, Esq., Secretary, Chamber of Commerce, Bombay, to the Secretary to the Government of Bombay, Revenue Department. Dated 25th November, 1898.

I am directed by the Committee of the Bombay Chamber of Commerce to acknowledge the receipt of your letter, No. 7423, dated 19th—22nd November, 1898, relating to the effect of increasing imports of refined sugar on the market for, and the price of, Indian sugars.

The question has been considered in Committee, but the members are unanimously of opinion that while it is evident that the extensive importation of exceptionally cheap sugar must tend to lower the price obtained for all other sugars, the importation of refined sugar from Mauritius and from countries in which bounties are given operates principally to supply deficiencies in local production, and does not to any serious extent affect the prices paid by the mass of the people for the unrefined sugar principally used by them.

Enclosure No. 4.

From C. H. Chetham, Esq., Secretary, Chamber of Commerce, Karachi, to the Under-Secretary to the Government of Bombay, Revenue Department. No. 269, *dated 6th December*, 1898.

I have the honour, by direction of the Managing Committee, to acknowledge receipt of your letter, No. 7423, dated 19th November, 1898, forwarding, for the opinion of the Chamber, a copy of a Circular letter from the Secretary to the Government of India, Department of Revenue and Agriculture, No. 15—48–3, dated 31st October, 1898, on the subject of the effect of increasing imports of

refined sugar on the market for, and the price of, Indian sugars. I am directed to inform you thereon that the Committee are of opinion that restrictions on the importation of beet-sugar are not called for for the following reasons :—

(*a*) That it is not shown that the extent of the sugar industry in India has suffered in any way.

(*b*) That in the opinion of the Committee the increase in the import of beet-sugar is largely due to an increased consumption of sugar by the natives of India.

(*c*) As very little cane sugar is grown in this province, the Committee have had no opportunity of ascertaining the effect of imported sugar on the working of sugar plantations.

(*d*) The Committee are of opinion that the imposition of a duty on a cheap and wholesome food commodity so largely used would be a retrograde step.

Enclosure No. 5.

Memo. from J. Pollen, Esq., Acting-Commissioner of Customs, Salt, Opium and Abkari, Bombay, to the Under-Secretary to the Government of Bombay, Revenue Department. No. 750, *dated* 12*th February*, 1899.

In submitting Mr. Morison's note with reference to Government Resolution, No. 7422, dated the 19th November, 1898, the Acting Commissioner would add that he has himself made further enquiries and finds that the Bengal or Benares sugar (which now sells in the Bombay market at the rate of Rs. 24 for six maunds, *i.e.*, about Rs. 6 per cwt.) is, and has been, so very little used that it hardly deserves to be taken into consideration for purposes of market comparison with Mauritius or other refined foreign sugars. This particular kind of Bengal sugar is not always easily obtained and is, the Commissioner understands, used only on important ceremonial or religious occasions by strictly orthodox, or specially scrupulous persons, who dread even the suspicion of the presence of bone-dust or other contaminating substance in the semi-sacred article.

2. In the first paragraph of his memorandum the Collector states that he has taken Bengal No. 1. as the sample, because there is practically no production of refined sugar in this Presidency, and later on (in paragraph 6) he says that it is not believed that recent foreign imports are affecting the local production of refined sugar in this Presidency. It is clear that no foreign imports can affect a thing that is practically non-existent, but what Mr. Morison probably means is that recent imports have not affected the efforts being made to produce refined sugar at Poona.

3. The sugar made at Poona seems to be able in its small way to hold its own against the imported article even at the present low prices of the latter, and the Poona manufacturer asserts that, if he were not prevented by Abkari administrative precautions from using the waste or non-crystallizable matter of his mill in making rum, &c., he could undersell foreign refined sugar even if reduced to still lower prices per cwt. than at present.

4. It would seem, however, that owing to the extent to which jagri (unrefined sugar) is used by villagers and others, there is not very much up-country demand for the refined article, home-made or foreign. It is said that three-fourths of the Indian sugar produced in India is consumed as raw sugar.

5. Taking everything into consideration, the conclusions Mr. Morison has arrived at are, the Commissioner considers, sound. It is the Mauritius sugar that is holding the market against the Continental bounty-fed product, and there is nothing whatever to show or lead to the belief that Continental sugars, bounty-fed or otherwise, are threatening the sugar cultivation of this Presidency with extinction.

6. While the bulk of the people persist in using jagri, *i.e.*, raw or unrefined sugar, the cultivation of sugar-cane in India will continue to flourish, and Mauritius and Continental sugars may be allowed to continue the fight for the possession of the refined sugar market without injuriously affecting the interest of the Indian cultivation in any way. And, after all, the interests of the ryot are the interests that it is chiefly desirable to safeguard. The town-population can take care of itself.

7. In conclusion it may be noted that a large quantity of unrefined Indian sugar finds its way annually to the United Kingdom, and attention might also be drawn to the fact that Government Revenue benefits to the extent of Rs. 19,00,000 a year as Customs duty on imported sugars.

No. 6 (Enclosure in Enclosure No. 5).

Mr. Morison's note on the effect of the increasing imports of Foreign sugar on the market for, and price of, Indian sugar.

1. The first point to be noted is that, in spite of the increased imports of foreign sugar, there has been no fall in the price of Indian *refined* sugar. The following statement shows, for the last ten years, the total imports of sugar into India, and the average prices during each year, of Indian and foreign refined sugar :—

Year.	Amount of Sugar imported.	Average market price per Cwt.	
		Bengal, No. 1.	Mauritius, No. 2.
	Cwts.	Rs. A. P.	Rs. A. P.
1889	1,617,710	15 12 0	13 9 2
1890	1,723,113	16 12 0	12 8 4
1891	2,931,901	17 2 0	11 11 8
1892	2,213,125	16 4 0	13 15 2
1893	1,959,818	15 8 0	13 8 0
1894	2,127,905	15 12 0	12 9 9
1895	2,490,612	17 10 0	12 10 1½
1896	2,730,963	17 0 0	12 7 1
1897	2,861,400	17 6 0	13 3 0
1898	4,608,630	18 0 0	10 6 3

Bengal No. 1 is taken as the sample of Indian refined sugar, as there is practically no production of refined sugar in this Presidency. It is not possible to give the variations in the price of *unrefined* sugar, there are so many local varieties and there are no reliable statistics in this office to draw upon for the purpose.

2. The statement shows that, instead of falling, the price of Indian *refined* sugar shows a tendency to rise, having been higher in 1898 (the year of heaviest imports of foreign sugar) than at any other time during the last ten years. The fact seems to be that the large imports of sugar from the Continent in 1898, while lowering the price of Mauritius sugar, have not made any appreciable difference in the demand for Indian refined sugar, but that for the last 25 years foreign sugar (especially from Mauritius) has been gradually supplanting Indian refined sugar, and that the heavy imports of last year will not create any new condition of things, but merely continue what has been going on for long.

3. The heavy imports of German and Austro-Hungarian sugars during the past two years seem to be due to exceptional circumstances of a more or less temporary nature. The beet crop of 1896–97 was very full and the price of the raw material the lowest on record. The recent Dingley Tariff in America put some restrictions on the import of Continental sugar into the United States. Then there was the fear, which was ultimately not fully confirmed, of the Mauritius crop of 1897 being a poor one ; this led merchants in Bombay to indent largely for European sugar,

and tempted German and Austro-Hungarian merchants to consign large quantities to India in the hope of realising good prices. The drought of 1896 in India had also no doubt caused fears of small local production, which would lead merchants to indent for sugar from abroad.

4. From a consideration of these circumstances, it does not seem probable that the abnormal imports of 1898 will continue. Shipments seem bound to fall considerably as these exceptional causes are removed, and it will probably be found that Mauritius sugar, which has taken the place of Indian sugar in Bombay for the last 25 years, will keep out Continental sugar to a great extent. It is better in quality, and is not likely to give way to these latter, unless there is a much larger difference in price in favour of the Continental sugars. As a matter of fact, there has been no forward business done in European sugar for the last three months, whereas large shipments of Mauritius have already commenced to arrive.

5. These large imports of cheap sugars, first from Mauritius and now from Europe also, are doubtless creating a large demand for refined sugar, especially in towns. Large classes of people, such as ordinary mill-hands and other operatives in Bombay, who a few years ago seldom indulged in sugar except as a luxury on rare occasions, now use it in tea and coffee daily, and doubtless the same is the case in towns up-country. The old religious prejudice against foreign sugar is dying away ; it is still, however, strong enough to continue a considerable demand for the dearer Indian refined sugar.

6. Though the information available on the subject in this office is limited, it is not believed that these recent foreign imports are affecting the local production of refined sugar in this Presidency. As stated above, Mauritius sugar has for many years almost entirely supplied the Bombay market, and the production of refined sugar in this Presidency has never been large. The experiments made at Poona in 1894–95, though apparently giving satisfactory results, do not appear to have resulted in any practical effort being made in the direction of increased production. It is also a fact that many of the Bengal sugar manufacturing companies have not paid dividends for the last three years, *i.e.*, from before the heavy imports from the continent began.

7. How far these cheap foreign sugars will take the place of Indian *unrefined* sugar, there is nothing in the trade records on the condition of the people of Bombay to show. But the fact that the imports from Mauritius have been going on increasing for several years seems to show that India does not possess special advantages for the cultivation of sugar-cane or the manufacture of sugar, and that the apprehended falling off in sugar cultivation, if it does actually take place, would relieve capital which could find other more profitable employment, while the rivalry between Mauritius and the Continent will cheapen sugar for the Indian consumer besides bringing in a considerable revenue to Government. The usual arguments in favour of free trade, which need not be repeated here, appear to apply with great force to the present case, and the imposition of any countervailing duty, or other restrictions on the import of sugar, would in the undersigned's opinion, be a mistake. The great rise in the sugar imports in 1898 may be a reason to make a searching enquiry into the causes which have operated adversely against the growth of the Indian industry during the past 30 years, but would not warrant the imposition of an artificial restraint on the importation of these cheap Continental sugars.

No. 21.

From F. Monahan, Esq., Officiating Secretary to the Chief Commissioner of Assam, to the Secretary to the Government of India, Department of Revenue and Agriculture. No. 97 Agri.—714 R., dated 23rd February, 1899.

With reference to the Revenue and Agriculture Department Circular, No. 15—48–3, dated the 31st October 1898, regarding the effect of the increasing

imports of refined sugar on the market for, and price of, Indian sugars and thereby on the profits of sugar-cane cultivation, I am directed to submit, for the information of the Government of India, copy of a letter, No. 537, dated the 21st February 1899, and enclosures, from the Officiating Director, Department of Land Records and Agriculture, Assam, communicating the result of his enquiries on the subject. It will be seen that the area under sugar-cane in the Brahmaputra Valley has remained stationary in recent years, while in the Surma Valley it is believed to have decreased considerably, and that these results are attributed partly to the increased importation of refined and unrefined sugar from Bengal. It is not known, however, what proportion of the refined sugar imported from Bengal is the produce of foreign countries. The Chief Commissioner does not apprehend any falling off of land revenue in consequence of the abandonment of sugar-cane cultivation in this Province.

Enclosure in No. 21.

From L. J. Kershaw, Esq., I.C.S., Officiating Director, Department of Land Records and Agriculture, Assam, to the Secretary to the Chief Commissioner, Assam. No. 537, *dated* 21*st February*, 1899.

In reply to your Memorandum, No. 405 Agri.—5522 R., dated the 29th November 1898, on the subject of the effect of increasing imports of refined sugar on the market for, and price of, Indian sugars, and thereby on the profits of sugar-cane cultivation, I have the honour to state that the only answer to the questions raised by the Government of India can be ascertained from an examination of two statements which I append—the first showing for the past 17 years for each plains district of the province the area under sugar-cane, and the second showing for the same period the annual imports of sugar (refined and unrefined) into the Surma and Brahmaputra Valleys. The exports of sugar from Assam are insignificant and may be excluded from consideration.

Although a comparison of the figures of 1881–82 with those of 1897–98 would seem to justify certain conclusions, the absence of anything like a gradual increase from year to year render the accuracy of these conclusions open to some doubt.

2. While in the Brahmaputra Valley, the area under cane has not only not expanded, but exhibits of late years a tendency, though not a marked tendency, to contract, the imports of sugar, both refined and unrefined, have risen enormously since 1881–82. In that year 11,564 maunds of refined and 28,849 maunds of unrefined sugar were imported as against 37,705 maunds of refined and 47,556 of unrefined sugar in 1897 and 1898. During the past few years, however, the imports of refined sugar have remained fairly constant at (in round numbers) 35,000 maunds and of unrefined sugar at roughly half a lakh of maunds and show no marked tendency to increase.

This development (out of all proportion to the increase in population) in the import trade of refined sugar since 1881–82, coupled with the stationary nature of sugar-cane cultivation, force one to the conclusion that the spread in the use of refined, in place of unrefined, sugar has affected, though perhaps to no very marked extent, the prospects of sugar-cane cultivation in the Province. Unfortunately, our trade statistics afford no information as to what proportion of the refined sugar imported into the Province is foreign, and what Indian, and for this reason any answer to the question raised by the Government of India is impossible.

3. Taking the area under cane in the Brahmaputra Valley (including Goalpara) at 20,000 acres, and the imports of unrefined sugar at 50,000 maunds,

the amount available for consumption (calculating the produce of an acre at 1,500 lbs.) is roughly 34 million pounds. The average consumption per head is, therefore, 13 lbs. Applying the reverse calculation to the Surma Valley, where the area under cane is unknown, some curious results are obtained.

The imports of unrefined sugar have increased from 79,354 maunds in 1881–82 to 170,584 maunds in 1891–92 and to 237,034 maunds in 1897–98. The population of the Surma Valley was $2\frac{1}{4}$ millions in 1881, $2\frac{1}{2}$ millions in 1891, and (estimated) $2\frac{3}{4}$ millions in 1897–98. Assuming that the standard of comfort is the same as in the Assam Valley, the consumption of unrefined sugar in these three years was $29\frac{1}{4}$ million pounds, $32\frac{1}{2}$ million pounds and $35\frac{3}{4}$ million pounds, respectively. The imports in these three years were $6\frac{1}{2}$, 13, and $19\frac{1}{2}$ million pounds, respectively. The produce of the valley was, therefore, $22\frac{3}{4}$ million pounds in 1881–82, $19\frac{1}{2}$ million pounds in 1891–92, and $16\frac{1}{4}$ million pounds in 1897–98.

At 1,600 lbs. per acre, the acreage under cane was, therefore, roughly 14,000 in 1881–82, 12,000 in 1891–92, and 10,000 in 1897–98.

The startling decrease in the area under cane is not caused by increased imports of refined sugar, but I am given to understand to the spread of blight in the Bombay variety of cane grown in the Surma Valley. The subject has not hitherto attracted any attention, but I will make it my business to enquire more closely into the subject.

4. On the whole, therefore, it appears that since 1881–82 the use of refined sugar has spread considerably among the better class of natives, and has, therefore, as no refineries exist in Assam, displaced to some extent the use of unrefined sugar and injuriously affected the cane cultivation of the Province. In the Brahmaputra Valley, sugar-cane cultivation has remained stationary where a considerable expansion to meet the increased demand might have been expected, while the Surma Valley sugar-cane cultivation is decaying, chiefly, I believe, owing to the spread of blight, but, partly, there can be no doubt, to the increased use of refined sugar.

The absence of any information, however, as to the source of the refined sugar consumed in Assam renders any answer to the specific question raised by the Government of India impossible.

Statements showing Imports of Sugar, Refined and Unrefined; in Maunds.

Year.	Sugar, Refined.		Total.	Sugar, Unrefined.			Total Sugar.		
	Brahmaputra Valley.	Surma Valley.		Brahmaputra Valley.	Surma Valley.	Total.	Brahmaputra Valley.	Surma Valley.	Total.
1881–82 ...	11,564	12,956	24,520	28,849	79,354	108,203	40,413	92,310	132,723
1882–83 ...	10,974	21,306	32,280	34,980	103,909	138,889	45,954	125,215	171,169
1883–84 ...	12,981	28,653	41,634	34,328	87,138	121,466	47,309	115,791	163,100
1884–85 ...	19,361	35,321	54,682	37,473	35,321	72,794	56,834	70,642	127,476
1885–86 ...	24,378	35,501	59,879	66,457	133,708	200,165	90,835	169,209	260,044
1886–87 ...	14,208	41,720	55,928	45,003	131,200	176,203	59,211	172,920	232,131
1887–88 ...	15,300	27,186	42,486	55,731	115,874	171,605	71,031	143,063	214,091
1888–89 ...	17,756	23,009	40,765	58,093	121,687	179,780	75,849	144,696	220,545
1889–90 ...	19,321	22,622	41,943	42,031	142,364	184,395	61,352	164,986	226,338
1890–91 ...	31,567	53,317	84,884	61,735	150,104	211,839	93,302	203,421	296,723
1891–92 ...	35,121	50,146	85,267	102,866	170,584	273,450	137,987	220,730	358,717
1892–93 ...	30,346	34,758	65,104	73,091	186,987	260,078	103,437	221,745	325,182
1893–94 ...	34,328	27,581	61,909	58,820	159,701	218,521	93,148	187,282	280,430
1894–95 ...	34,567	34,564	69,131	47,039	218,211	265,250	81,606	252,775	334,381
1895–96 ...	36,903	35,680	72,583	46,730	203,510	250,240	83,633	239,190	322,823
1896–97 ...	41,732	46,061	87,793	54,388	259,155	313,543	96,120	305,216	401,336
1897–98 ...	37,705	41,422	79,127	47,556	237,039	284,595	85,261	278,461	363,722

Area under Sugar-cane in the Surma and Brahmaputra Valleys from 1881-82 *to* 1897-98 ; *in Acres*

	1881-82.	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.	1887-88.	1888-89.	1889-90.	1890-91.	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.	1897-98.
Total for Assam, excluding Goalpara.	16,352	15,231	14,917	17,713	20,632	20,352	17,729	19,215	19,271	17,798	18,432	19,667	17,340	18,023	16,427	18,877	15,913

No. 22.

From C. H. A. Hill, Esq., Secretary for Berar to the Resident at Hyderabad, to the Secretary to the Government of India, Department of Revenue and Agriculture. No. 62, *dated* 28*th February*, 1899.

I am directed to refer to your Circular, No. 15—48-3, dated the 31st October, 1898, regarding the effect of increasing imports of refined sugar on the market for, and the price of, Indian sugars, and in reply to forward a copy of the Director of Land Records' report submitted by the Commissioner with his No. 70, dated the 19th February, 1899. The report shows that the cultivation of sugar-cane and the production of sugar possesses no importance in Berar, and that as regards consumption of refined sugar the bounty-fed article imported from Bombay is rapidly displacing the non-protected refined sugar manufactured in the North-Western Provinces.

Enclosure in No. 22.

From the Director of Land Records and Agriculture, Hyderabad Assigned Districts, to the Commissioner, Hyderabad Assigned Districts. No. 38, *dated* 9*th January*, 1899.

I have the honour to acknowledge the receipt of your endorsement, No. 8384 of the 7th December, 1898, forwarding a copy of Circular No. 15—48-3, dated 31st October, 1898, from the Government of India, Department of Revenue and Agriculture, on the subject of the effect which the increasing imports of refined sugar from Europe and from Mauritius into India have so far exercised, or are tending to exercise, on the market for, and the price of Indian sugars, and thereby on the profits of sugar-cane cultivation in India.

2. The Government of India desire that inquiry should be made as to the effect of the competition of imported sugars on—

(*a*) the cultivation of sugar-cane,
(*b*) the profits of such cultivation, and
(*c*) the profits of the sugar industry ; and further,
(*d*) the possibility of any falling off in the land or canal revenues, in consequence of the abandonment of sugar-cane cultivation.

3. Before dealing with these points in detail it is necessary to examine the statistics of our trade in sugar. Tables A and B* attached to this letter show, respectively, the extent of our imports and exports of refined and unrefined sugar, during the last five years. Our chief trade in sugar is with Bombay, the North-West Provinces and Bombay Port ; the items for the remainder of the Provinces included in the tables are so small that they may be left out of account. Our refined sugar comes almost entirely from the North-West Provinces and Bombay

* Table B, not reproduced, shows that the average exports of sugar for the five years 1893-94 to 1897-98 were : Refined, Mds. 6,344, valued at Rs. 81,177, and Unrefined, Mds. 4,559, valued at Rs. 33,757.

Port; the average annual import from the former being 20,575 maunds, against 72,416 maunds from Bombay Port. It is evident that the latter is the imported article, the refined sugar of the North-West Provinces being locally manufactured. As far then as Berar is concerned the competition to supply our wants in refined sugar is between the indigenous article of the North-West Provinces and the imported sugars of Bombay, and the proportion in which they are consumed in the Province stands at about 2 of the former to 7 of the latter. The reasons why the imported sugar is more in favour than that of the North-West Provinces are not far to seek; to begin with, the railway freight from Bombay is much less than that from the North-West Provinces, imposing a severe handicap on the produce of the latter, and also the price of the imported article is much cheaper, being Rs. 9-6 per maund against Rs. 12-8 in the North-West Provinces. Presuming then that the qualities of the two sugars are equal, it is evident that, as far as our Province is concerned, the produce of the North-West Provinces cannot hope to compete with imported sugar, and the trade statistics prove this. In 1893-94, the imports of refined sugar from the North-West Provinces were 27,702 maunds; in each subsequent year there has been a steady decline till in 1897-98 the quantity imported amounted to only 11,638 maunds, or considerably less than half the former quantity. A more than corresponding rise is to be observed in the imports of refined sugar from Bombay Port; commencing at 50,158 maunds in 1893-94, the figure has now risen to 127,625 maunds, or more than 2½ times the former import.

4. *To turn to (a) the effect of the competition of imported sugar on the cultivation of sugar-cane in Berar.*—Table C gives the details of the area devoted to the growth of sugar-cane in each district in the Province, and it will at once be observed that the total area of this crop is very insignificant. The average of the last five years amounts to only 3,859 acres, out of a total area under cultivation of 6,634,050 acres or ·06 per cent. of the whole. The annual figures certainly show a steady decline in this cultivation, since they have dropped from 5,315 acres in 1893-94 to 3,159 acres in 1897-98, but I do not think that this decline can be attributed to the competition of foreign sugars. We have no sugar refining mills in Berar, and our production finds its way to market either in the forms of canes sold separately or as "gur" or unrefined sugar. That the supply of unrefined sugar is not nearly equal to the demand is clearly proved from the import figures, which show that we take an annual average amount of 164,208 maunds from Bombay, Bengal, and the North-West Provinces. Any further extension of the area under sugar-cane would result in an increased output of unrefined sugar which would find a ready sale within the Province. The decline of sugar-cane cultivation in Berar is, in my opinion, partly attributable to three successive years of short rainfall, and partly to want of capital and enterprise on the part of the cultivators. Sugar-cane is a crop that takes 12 months to mature, and requires a plentiful supply of manure and water and an extended period of labour. In Berar it is all grown under wells, and three years of drought have had a marked effect on the water-supply; rather than risk the failure of the sugar-cane crop, the cultivator prefers to put down vegetables, of which he can get two or three crops in the year, and can sell readily in the local markets.

5. (*b*) *The effects on the profits of sugar-cane cultivation.*—Since we have no sugar-refining industry in Berar, the imported refined sugar does not come into competition with the local production of "gur" or unrefined sugar. I have already shown that our requirements are much in excess of our produce, and that we import unrefined sugar in large amounts. Until the cultivation of sugar-cane in Berar extends sufficiently to satisfy the local demand for unrefined sugar, the question of the competition of refined sugar does not come in. Unrefined sugar can be imported at a price varying from Rs. 5 to Rs. 6 per maund, which is a little more than half the cost of the refined article, until therefore the latter drops to something nearer the price of the former, it is not likely to have any effect on the profits of cultivation of sugar-cane in Berar.

6. (*c*) *The effects on the profits of the sugar industry.*—This is a question with which our Province is not concerned, since refined sugar is not manufactured here. We import the article to a large extent, and of course buyers will go to the cheapest market, and as matters stand at present this is Bombay Port. Until

the price of the refined sugar of the North-West Provinces falls to a level with that of the foreign article, the import into Berar of bounty-fed sugars will continue to increase.

7. (*d*) *The possibility of any falling off in the land or canal revenues in consequence of the abandonment of sugar-cane cultivation.*—Were the growth of sugar-cane absolutely abandoned in Berar, it would not in any way affect our land revenue. We have no large water-works, and all our sugar-cane is grown under wells, and the crop cultivated is not taken into consideration in fixing the assessment of well lands. Our assessments run for 30-year periods, and are not liable to fluctuations according to the crops grown ; even should dry crops be cultivated and the water of the well remain unused, the garden land assessment must be paid just the same.

8. A few remarks on our exports of sugar seem necessary. Although our production is not nearly equal to the demand, still we export some 4,500 maunds of unrefined sugar annually ; and further, although refined sugar is entirely an imported article, yet our annual exports amount to 6,300 maunds. These are some of the vagaries of trade that are inexplicable. As Colonel McKenzie once put it, Berar seems to act as a bonded warehouse for the Central Provinces with reference to this article. What is still more strange is that the refined sugar, imported from Bombay Port, seems to some extent to be again returned to the Bombay Presidency. To attempt to explain this appears impossible.

TABLE A.—*Statement showing the Imports of Sugar in the Hyderabad Assigned Districts during the five years ending* 1897–98.

Article.	1893-94.		1894-95.		1895-96.		1896-97.		1897-98.		TOTAL.		AVERAGE.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Mds.	R.	Mds.	R.	Mds.	R.	Mds.	R	Mds.	R.	Mds.	R.	Mds.	R.
Refined	80,890	8,81,055	69,747	8,09,493	90,855	9,52,629	89,720	8,56,099	139,933	12,46.245	471,145	47,45.521	94,229	9,49,104
Unrefined ..	185,489	10,14,293	136,474	7,35,791	135,253	7,11 424	167,114	8,81,941	205,099	12,74,906	829,529	46,18,355	165,906	9,23,671

Table B.—Not reproduced.

TABLE C.—*Statement showing the Area under Sugar-cane Crop in the Hyderabad Assigned Districts during five years ending* 1897–98.

Year.	AREA UNDER SUGAR-CANE CROP IN						
	Akola.	Amraoti.	Basim.	Buldana.	Ellichpur.	Wun.	TOTAL.
1	2	3	4	5	6	7	8
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
1893–94	487	579	1,266	2,477	99	407	5,315
1894–95	376	520	1,039	1,634	87	347	4,003
1895–96	331	487	984	1,478	79	276	3,635
1896–97	159	525	486	1,747	59	205	3,181
1897–98	237	417	419	1,769	80	237	3,159
TOTAL	1,590	2,528	4,194	9,105	404	1,472	19,293
Average	318	506	839	1,821	81	294	3,859

AKOLA,
9th January, 1899.

F. W. FRANCIS,
Director of Land Records and Agriculture.

No. 23.

From the Chief Commissioner, Ajmere-Merwara, to the Secretary to the Government of India, Department of Revenue and Agriculture. No. 189—530, *dated* 11*th March*, 1899.

I have the honour to acknowledge the receipt of your Circular letter, No. 15—48–3, dated the 31st October, 1898, regarding the effect of increasing imports of refined sugar on the market for, and the price of, Indian sugars.

2. In reply, I have the honour to submit, for the information of the Government of India, a copy of the correspondence, noted on the margin, and to add that further information has been called for from the Commissioner, which will be submitted immediately it is received.

(1) From the Commissioner, Ajmere-Merwara, to the Chief Commissioner, Ajmere-Merwara, No. 144, dated 17th February, 1899, with enclosures.
(2) To the Commissioner, Ajmere-Merwara, from the First Assistant to the Agent to the Governor-General, Rajputana, and Chief Commissioner, Ajmere-Merwara, No. 530, dated — March, 1899.

Enclosures in No. 23.

Enclosure No. 1.

From the Commissioner, Ajmere-Merwara, to the Chief Commissioner, Ajmere-Merwara. No. 144, *dated* 17*th February*, 1899.

With reference to your office endorsement, No. 1372—530, dated the 17th November, 1898, forwarding, for enquiry and report, the Government of India Circular, No. 15—48–3, dated the 31st October, 1898, regarding the effect of increasing imports of refined sugar on the market for, and the price of, Indian sugars, I have the honour to forward a copy of letter No. 690, dated the 4th February, 1899, from the Assistant Commissioner, Ajmere, with enclosures, and to state that the returns prepared by the Assistant Commissioner of Ajmere prove conclusively that imported sugar is being used to a very much larger extent than formerly, and thus either the consumption of both imported and indigenous sugar must have increased very considerably, or else the former is largely replacing the latter in the requirements of the native population of India.

2. The Assistant Commissioner of Merwara has collected no statistics on the subject, but his enquiries tend to show that a religious prejudice exists against sugar of foreign manufacture, the methods employed in which are suspected to be opposed to caste prejudices, but in view of the figures furnished by the Assistant Commissioner of Ajmere, I am unable to think that this prejudice affects the consumption of imported sugar to any material extent.

3. The area under sugar cultivation in Ajmere-Merwara is very small, but so far no sign of the plant going out of cultivation has been recorded.

No. 2 (Enclosure in Enclosure No. 1).

From the Assistant-Commissioner, Ajmere, to the Commissioner, Ajmere-Merwara. No. 690, *dated* 4*th February*, 1899.

I have the honour to acknowledge the receipt of your endorsement No. 5611, dated the 23rd November, 1898, regarding the effect of the increasing imports of refined sugar on the market, and the price of Indian sugar in the Ajmere district.

Statement showing the area cultivated and the out-turn of sugar-cane in the Ajmere district from 1894–95 to 1898–99.

2. I enclose the statement marginally noted.

3. It is clear from the Traffic Manager's return that the import by rail of foreign, *i.e.*, refined, sugar into the Ajmere district has increased by leaps and bounds since 1894. During the year ending the 31st March, 1898, the import was five times what it was in the year ending the 31st March, 1894. The increase has not, however, been absolutely steady, as during the year ending the 31st March, 1897, the import was a good deal less than during the year ending the 31st March, 1896. I do not know that it would be possible to obtain a satisfactory explanation for this. But I think it may be taken that the return shows that foreign, that is refined, sugar is steadily displacing Indian-made sugar in the markets of the Ajmere district. The Revenue Extra Assistant Commissioner informs me that foreign, that is refined, sugar is much more largely used in the bazaars for making sweetmeats than formerly.

4. The large consumption of sweetmeats in India and the vast size of the Indian Continent must make India a most valuable market for sugar, and if the case for the whole of India is the same as the case for the Ajmere district, it behoves the British Government to take steps to stimulate the manufacture of refined sugar in India itself and to secure that the Indian import trade in refined sugar is facilitated far over West Indian sugar plantations now reported to be in so bad a plight.

5. The cultivation of sugar-cane in the Ajmere district, as shown in the statement attached, is limited to a few villages, and during the past five years it has only averaged some 400 acres with an out-turn of some 4,300 maunds of unrefined sugar. But the area cultivated under sugar-cane during the year 1898–99 was little more than half the area cultivated under sugar-cane in 1894–95. This may be to some extent due to the precarious rainfall of the Ajmere district. But I am inclined to attribute it to the increased import of foreign refined sugar, which the frugal native mind has found to taste sweeter and to go farther than the product of the country.

6. As the area cultivated under sugar-cane is so small, and as the revenue demand of the Ajmere district has been fixed at a very low figure, and is a fixed demand (except in the case of some 38 variable villages) for a certain number of years, the decrease in cultivation of sugar-cane can, I consider, have no effect on the payment of Government revenue or on the ability of the cultivators to pay the same.

No. 3 (Enclosure in No. 2).

Statement showing the Area under Sugar-cane Cultivation for the last five years.

Name of Village.	1894-95.		1895-96.		1896-97.		1897-98.		1898-99.		Total.	
	Area.	Produce.	Area.	Produce.	Area.	Produce.	Area.	Produce.	Area.	Produce.	Area.	Produce.
	Acres.	Mds.	Acres.	Mds.	Acres.	Mds. Srs.	Acres.	Mds. Srs.	Acres.	Mds. Srs.	Acres.	Mds. Srs.
Total for Ajmere, &c.	539	4,969	446	4,111	441	4,241 30	292	4,139 30	295	4,116 35	2,013	21,578 15

G. R. KHANDEKAR,
for *Assistant Commissioner, Ajmere.*

Enclosure No. 4.

From the First Assistant to the Agent to the Governor-General, Rajputana, and Chief Commissioner, Ajmere-Merwara, to the Commissioner, Ajmere-Merwara. No. 530, *dated* — *March*, 1899.

In acknowledging the receipt of your letter No. 144, dated the 17th February, 1899, I am directed to request that statistics for the past ten years may be

furnished in the tabulated form used by the Assistant-Commissioner of Ajmere in the statement which forms an enclosure to your letter under reference, showing the area under sugar-cane cultivation and the import of foreign sugar into both the districts under your charge.

2. The Chief Commissioner would also be glad to be supplied with a table showing for the same period the comparative prices of the different classes of both country and foreign sugar from the coarsest to the finest.

No. 24.

Extract from the Proceedings of the Government of Madras, Revenue Department, —No. 962 Mis., dated 8th March, 1899.

Read—

Letter* from the Chamber of Commerce, Madras, dated 17th February, 1899, submitting report on the subject of the effect of the competition of bounty-fed sugar imported into India on the local industry.

*Copy attached.

Order thereon by the Government of Madras.

The Board of Revenue is requested to submit, with the least practicable delay, the report called for in G.O. No. 681, dated 15th November, 1898.

2. The letter of the Vice-Chairman, Chamber of Commerce, Madras, will meantime be communicated to the Government of India.

Enclosure in No. 24.

From C. E. P. VansAgnew, Esq., Vice-Chairman, Chamber of Commerce, Madras, to the Secretary to the Government of Madras, Revenue Department. Dated 17th February, 1899.

With reference to the G.O. No. 681 (Revenue), dated the 15th November, 1898, in which the Chamber is asked to supply the Government with information on the subject of the effect of the competition of bounty-fed sugars imported into India on the local industry, I have the honour to inform you that, while the area of cultivation of sugar-cane in this Presidency may not yet have been adversely affected, there can be no doubt that the competition has forced down the prices of refined sugar manufactured in this country to such a point as to seriously endanger the future of the industry.

In support of this opinion, the Chamber would invite attention to the following figures of sale prices for the last six years of sugar locally refined by the firm which is most largely interested in the manufacture of sugar in this Presidency. The prices are gross realised in Calcutta, which is the largest and most representative market in this country, and refer to only two brands, of more or less equal value :—

Year.	Highest Price.	Lowest Price.
	Rs. a. p.	*Rs. a. p.*
1893	10 1 0	9 15 0 per Bengal maund.
1894	9 15 0	9 8 0 „ „ „
1895	9 8 0	8 12 0 „ „ „
1896	8 14 0	8 11 6 „ „ „
1897	8 11 6	8 1 0 „ „ „
1898	8 1 0	7 10 0 „ „ „

In the opinion of the Chamber, the reason for this great falling off in price, notwithstanding a steady improvement in the quality of the article, is undoubtedly

the reduction in the price of beet sugar during the above period, brought about by the heavy bounties by which that industry is subsidised on a steadily increasing scale. With the falling off in the price of the locally refined article, it would have been impossible to compete with the imported bounty-fed sugar but for the margin which, it is well-known, refiners have in past years enjoyed on the price of raw sugars. That margin must now, with the fall in refined sugars, have disappeared, and though it may be that the price of the raw sugars may admit of some reduction, the Chamber doubts it, in view of the high price of poonac manure and the recent spread of disease among canes.

In any case, there is a limit below which raw sugar cannot be profitably produced, while there is no apparent limit to the bounties, which were again increased in Germany only last year. A further fall in the price of the refined article must adversely influence the market for the raw product, and thus react upon cultivation, leading eventually to the curtailment, if not to the complete extinction, of the Indian sugar industry.

The Chamber sees no means of escape from this calamity other than the abolition of the bounties by international agreement, or the imposition in this country of countervailing import duties on bounty-fed sugar.

No. 25.

From the Revenue and Financial Secretary to Government, Punjab and its Dependencies, to the Secretary to the Government of India, Revenue and Agricultural Department. No. 19, *dated Lahore, 7th March,* 1899.

In compliance with the orders contained in you letter No. 15—48-3, dated 31st October, 1898, I am directed by the Lieutenant-Governor to submit, for the information of the Government of India, copy of a letter No. 508, dated 3rd March, 1899, and enclosures, from the Director of Land Records and Agriculture reporting the results of his inquiries regarding the effect of the competition of imported sugars on the cultivation of sugar-cane and on the sugar industry in the Punjab.

2. As it is understood that this report is very urgently required by the Government of India, it is now forwarded without any comments. If on examination the Lieutenant-Governor finds it necessary to make any remarks with reference to Captain Dunlop-Smith's conclusions, which on the whole appear to tally with the statistics available, a further communication will be addressed to you.

I have, &c.,
M. W. FENTON.

Enclosures in No. 25.

Enclosure No. 1.

From Captain J. R. Dunlop-Smith, Director of Land Records and Agriculture, Punjab, to the Revenue Secretary to Government, Punjab. No. 508, *dated 3rd March,* 1899.

Preliminary.

In reply to your No. 87,* dated 17th November, 1898, forwarding a copy of Government of India Circular No. 15—48-3 directing an inquiry into the sugar question, I have the honour to report as follows.

* Proceedings, November, 1898, Nos. 1-3 A.

Consumption of refined and unrefined sugar in the Province.

2. The following table which has been compiled from the Internal Trade Reports prepared in the Financial Commissioner's Office gives the imports and exports in maunds of both refined and unrefined sugar into, and out of, the Punjab during the last eleven years :—

1	2	3	4	5	6	7	8
Year.	Refined Sugar.			Unrefined Sugar.			Total columns 4 and 7.
	Imports.	Exports.	Net Imports.	Imports.	Exports.	Net Imports.	
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
1887–88	257,112	710	256,402	1,464,228	216,707	1,247,521	1,503,923
1888–89	256,201	2,696	253,505	1,254,721	438,934	815,787	1,069,292
1889–90	321,466	2,309	319,157	949,848	377,599	572,249	891,406
1890–91	474,180	4,123	470,057	1,299,724	525,394	774,330	1,244,387
1891–92	376,029	2,273	373,756	2,027,391	301,605	1,725,786	2,099,542
1892–93	373,429	3,054	370,375	1,665,002	331,908	1,333,094	1,703,469
1893–94	629,607	2,267	627,340	2,074,862	271,170	1,803,692	2,431,032
1894–95	509,327	3,385	505,942	2,190,021	321,625	1,868,096	2,374,338
1895–96	699,844	16,419	683,425	1,403,124	345,455	1,057,669	1,741,094
1896–97	769,411	1,231	768,180	1,129,806	455,826	673,980	1,442,160
Average	466,661	3,847	462,814	1,545,873	358,622	1,187,251	1,650,065
1897–98	963,981	2,160	961,821	1,366,285	810,944	555,341	1,517,162
Difference per cent.	+ 106	— 43	+ 107	— 11	+ 126	— 53	— 8

Except for a check from 1891 to 1893, the imports of refined sugar have steadily increased, and the returns last year were 106 per cent. higher than the average of the previous ten years, and nearly four times the total of 1887–88. The exports have always been inconsiderable and require no comment. The imports of unrefined sugar have also declined, but not to anything like the same extent, and the fluctuations from year to year have been considerable. The exports on the other hand have risen by as much as 126 per cent. The total of last year is very remarkable. The result is that while the balance of refined sugar available for consumption in the Province has more than doubled, the balance of the unrefined article has been reduced by over one-half. If the two balances are combined, as in column 8 of the above table, it will be seen that the amount of both refined and unrefined sugar left for consumption in the Province in 1897–98 was almost exactly the same as in 1887–88, and was slightly less than the annual average of the previous decade.

Effect of imports of refined sugar.

3. These figures show that the refined sugars have been gradually ousting the unrefined varieties imported from other parts of India, and no doubt the same process has been going on, though in a very small degree, at the cost of the same product manufactured within the limits of the Province. Most of the unrefined sugar is imported from the North-Western Provinces, and especially in late years the falling-off has been considerable. The total of last year's imports was only 7 per cent. below that of 1887–88 and 3 per cent. below the annual average of the previous ten years, but it fell short of the total of 1894–95 by as much as 38 per cent. The Punjab was never famous for the manufacture of high-class country sugar, and depended largely on importations of the Chandausi and Moradabad varieties for the consumption in towns. The country classes, however, have been in the habit of using gur only as an article of daily food or coarse sugar locally prepared. Refined sugar has up till now had to contend with the usual opposition of a conservative race to a novelty, and more especially with the prejudices of a people whose very diet is affected by religious and social considerations. Only a few years ago no little agitation was aroused by the circulation of a rumour that bone-dust was used in the process of refining. In spite of these difficulties, which are quickly disappearing, refined sugar has forced its way rapidly. Its cheapness combined with its attractive appearance and its palpable superiority as an article of food have popularised it with the less scrupulous, and confectioners soon found out an easy and very profitable way of overcoming

the objections of the orthodox by adulterating it with Indian sugars and selling the compound at the old high rates. The opposition to the foreign article is now weak, and I think there is ample evidence to show that it is regularly used at all social and public gatherings, and even in private households in towns. In the city of Lahore, for instance, there are only two confectioners at the present time who use indigenous sugars in the manufacture of sweets, and their wares are almost exclusively reserved for use during fasts and at religious ceremonies. The business done by them moreover is very limited. I can recall no other town of any importance with which I am acquainted in the Upper Punjab where there is any confectioner who uses Indian sugar. These changes have seriously affected the trade with the North-Western Provinces, which will as time goes on dwindle to even smaller proportions, but the effect on the Punjab industry has been very slight.

Fluctuations in the area under sugar-cane.

4. Refined sugar has, however, not found its way into the villages to any appreciable extent. There the people are more bound by custom and tradition than the inhabitants of towns and use gur as an article of daily food. Gur is sweeter and more adapted to the necessities of the zamíndár, and is very much cheaper than refined sugar. Its price varies from Rs. 4 to Rs. 5 per maund, while imported sugar sells at from Rs. 9 to Rs. 10 for the same quantity. Until therefore the Punjab peasant makes a radical change in his simple style of living and so long as the cost of cultivating cane maintains the same proportion to the sale price of gur there is not much fear of the area under sugar-cane falling off. The following table shows the fluctuations in the acreage under cane and other food stuffs during the last eleven years :—

1	2	3	4	5	6
Year.	Area under food crops in the kharíf.	Area under food crops in both kharíf and rabi.	Area under sugarcane.		
			Actual.	Per cent on	
				Column 2.	Column 3.
	Acres.	Acres.	Acres.		
1887–88	8,620,862	20,283,938	366,698	4·2	1·8
1888–89	8,260,158	21,687,751	391,060	4·7	1·8
1889–90	8,861,806	18,711,347	325,562	3·7	1·7
1890–91	8,489,257	20,753,194	323,868	3·8	1.5
1891–92	7,680,098	19,065,700	363,976	4·7	1·9
1892–93	10,710,032	23,808,137	314,249	2·9	1·3
1893–94	8,475,540	22,628,049	327,604	3·9	1·5
1894–95	8,212,971	21,396,293	339,930	4.1	1·6
1895–96	6,942,338	16,443,121	385,908	5·6	2·3
1896–97	6,496,392	15,842,028	398,202	6·1	2·5
Average	8,274,945	20,061,955	353,705	4·2	1·7
1897-98	9,452,948	22,333,684	348,121	3·7	1·6
Difference per cent....	+ 14·2	+ 11·3	— 1·5	— 11·9	— 5·9

The fluctuations in the area under sugar-cane are clearly due to variations in the character of the seasons, and the above figures by no means show that the cultivation of this staple is declining. The year which gave the largest out-turn of cane was 1896–97, when the area under food crops in the kharif was the lowest,

and in 1892–93 the area under kharíf food crops was the highest on record, but the area under cane was the lowest. The percentages in the last two columns show that cane is easily holding its own.

Extension of Sugar-cane cultivation.

5. The statement appended to this letter gives the total irrigated and unirrigated areas in the Province since 1887–88. It will be seen that there has been a steady extension of cane cultivation on irrigated lands in those districts in which the canals and other sources of artificial irrigation have most largely been developed. Such districts are Jhang and Gujránwála, in which the Chenab Colony is situated, Hissar, Karnál, Umballa, Hoshiárpur, Ludhiána, Ferozepore, Lahore, Gurdáspur and Siálkot.

Profits of Sugar-cane cultivation.

6. As to the profits of cane growing I have already stated that so long as the cost of cultivation bears very much the same relation as at present to the sale price of gur these profits will continue to be realised. The cost of preparing the land, of irrigation, weeding and harvesting has increased no doubt in the last twenty years, owing to the rise in wages, but not to such an extent as to cripple the production of any particular staple. In the case of suger-cane, moreover, it has been counterbalanced by the large reduction in the expenses of crushing the juice due to the introduction of the various kinds of iron mills. It would be difficult to draw up a statement for the whole Province showing the exact effect of the rise in wages and the reduction of expenditure in manufacture on the whole cost of the production of gur, but it may be assumed that this has not increased in the same proportion as its value in the market has.

Effect of foreign sugar imports on the manufacture of gur.

7. The following figures give the prices of gur per maund during the last eleven years :—

1887–88.	1888–89.	1889–90.	1890–91.	1891–92.	1892–93.
Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
3 13 8	3 6 5	4 13 9	5 6 11	4 4 8	4 5 1

1893–94.	1894–95.	1895–96.	1896–97.	Average.	1897–98.
Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
4 3 10	4 2 7	4 0 4	4 2 5	4 4 4	4 7 7

The price has thus risen by 16·1 per cent. since 1887–88 and is 4·8 per cent. above the annual average of the last decade. The prices of 1889–90 and 1890–91 have not been reached since, but the table in paragraph 4 above shows in both of these years the area under cane was much below the average. There is certainly no tendency towards a fall in price, so that it cannot be said either that the profits of cultivation are declining or that refined sugar has yet entered into competition with gur.

Reduction in the number of sugar refineries.

8. Sugar-cane is used in the Punjab chiefly for the manufacture of gur by the zamíndárs themselves, but a small proportion is used for the production of coarse country sugar by the class known as Khandsáris. The latter either purchase the standing crop or contract with the owner for supply of so much *ráb*, which they convert into sugar in their own refineries (Khánchi) These refineries are generally confined to large towns, but are occasionally met with in villages also, and there seems no doubt that they have been affected by the foreign imports. Europe-made sugar sells at from Rs. 9 to Rs. 10 per maund, but the indigenous article sells at from Rs. 9 to Rs. 15. So the latter must give way. It requires moreover in the preparation of sweetmeats less than half the labour which has to be spent on country sugar. The refineries in villages are holding their own, but their trade is slipping away from those in the towns. Agents of European firms are being gradually established in the different trading centres of the Province and their operations are contributing largely to the extinction of

country sugar. The following table which has been compiled from information collected during a recent tour through three of the largest cane-producing districts in the Province shows the decline in the number of refineries in the last eleven years:—

1	2	3	4	5	6	7	8
District.	Town.	Refineries at work in		Increase.	Decrease.	Net Decrease.	
		1877–88.	1897–98.			Actual.	Per cent.
Hoshiárpur	Tánda	7	3	...	4		
	Urmar	34	19	...	15		
	Garhdiwála ...	25	15	...	10		
	Hariána	49	31	...	18		
	Mukerián	23	34	11	...		
	Total ...	138	102	11	47	36	26
Jullundur	Basti Danishmandán	8	10	2	...		
	Basti Darweshán ...	37	31	...	6		
	Basti Ghuzan ...	17	8	...	9		
	Jullundur	15	13	...	2		
	Total ...	77	62	2	17	15	19·5
Gurdáspur	Kádián	10	7	...	3		
	Srigovindpur ...	33	21	...	12		
	Harchowál	7	13	6	...		
	Total ...	50	41	6	15	9	18
	Grand Total ...	265	205	19	79	60	22·6

The markets selected were typical, and the above table gives a fairly accurate idea of the rate at which the indigenous industry is shrinking. Out of twelve towns only three show an increase, which has probably been caused by refiners who finding their trade going transferred their shops to more promising localities.

The possibility of future curtailment of sugar-cane cultivation from the assessment point of view.

9. I have gone over the Assessments and Settlement Reports of the Kángra, Gurdáspur, Amritsar, Shahpur, Gujránwála, Lahore and Siálkot Districts, all recently settled, and can find no allusion to the possibility of the future curtailment of cane cultivation. And the annual revenue reports received in recent years from other districts such as Hoshiárpur and Jullundur are also silent on this head. Thus neither the Settlement Officers, who must have an intimate knowledge of the resources of the tracts the assessments of which they revise, nor the Deputy Commissioners, who periodically review the changes in crops and cultivation in their districts, have felt any apprehensions as yet as to the future of sugar-cane.

Indirect results of foreign imports.

10. Two indirect results have doubtless been caused by foreign imports. The first is, that the comparatively small amount of sugar-cane which was formerly converted into sugar by local refiners and has now been set free has gone to supply the increased demand for gur caused by the rise in the agriculturist population. The second result is, that the area under sugar-cane has not expanded so largely as it would have done had the indigenous refining industry not contracted. In other words, the foreign imports have prevented to a slight extent the area under cane from increasing so largely as it would presumably have done under the old conditions, but have not had the effect of actually causing that area to shrink. It follows therefore that this new trade in

beet-sugar has had no effect in the past on the land revenue or canal dues, and there is no probability of its making itself felt in this direction in the immediate future. At the same time I am strongly of opinion that the subject should not be lost sight of, and I would suggest that sugar-cane be added to the list of crops for which forecasts have to be prepared. Such forecasts would, of course, be submitted only from selected districts.

Final.

11. I have the honour to apologise both for the delay in the reply to the Government of India reference and for the somewhat disjointed manner in which the results of our inquiries have been arranged in this letter. But I purposely postponed taking up the question till I could have an opportunity of visiting the chief cane districts and making local investigations. I concluded these only two days ago at Batála in Gurdáspur, so that the letter has been written under great pressure. The issues raised by this question are very important and they will not be lost sight of by this Department. The copy of the Review of the question of countervailing duties on bounty-fed sugar is returned herewith, as desired in your Memo., No. 14 A., dated 3rd February, 1899.

No. 2 (Enclosure in Enclosure No. 1).

Area under Cane.

—	Detail.	1887-88.	1888-89	1889-90.	1890-91.	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.	1897-98.
		Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
TOTAL FOR THE PUNJAB.	Irrigated ..	275,811	264,455	221,374	245,873	259,306	237,418	226,785	238,450	266,159	313,920	280,180
	Un-irrigated ..	99,887	126,605	104,183	77,995	104,670	76,831	100,819	101,480	119,749	84,282	67,941

Camp Montgomery,
3rd March, 1899.

GANGA SAHAI, PERSONAL ASSISTANT,
for Director of Land Records and Agriculture, Punjab.

No. 26.

From the Chief Secretary to Government, N.-W. Provinces and Oudh, to the Secretary to the Government of India, Revenue and Agricultural Department. No. 637, *dated Allahabad,* 15*th February,* 1899.

I am directed to acknowledge the receipt of your Circular, No. 15—48—3, dated 31st October, 1898, regarding the effect which the increasing imports of refined sugar from Europe and from the Mauritius into India have exercised or are tending to exercise on the market for, and the price of, Indian sugars, and thereby on the profits of sugar-cane cultivation in India. The importance of the question has also been pressed upon the Lieutenant-Governor's notice by the Upper India Chamber of Commerce as well as by communications from other sources, and during his cold weather tour, which took him through many of the principal cane-producing districts in the Meerut and Rohilkhand Divisions, His Honour made enquiries on the subject from cultivators and merchants interested in the trade.

2. The Director of Agriculture was also instructed to make a careful enquiry into the whole subject, and I am now to forward, for the information of the Government of India, a copy of a full memorandum drawn up by the Officiating Director. This memorandum, which takes account of all the aspects of the case and all the interests concerned, is so complete and so much in harmony with the Lieutenant-Governor's own views as to leave him little to add in forwarding it to the Government of India.

3. The question that first suggests itself for examination is one that is susceptible of accurate statistical investigation. It is whether, as a matter of fact, up to the present there has been any such decrease in the area under sugar-cane as would show that the importation of the cheap foreign article had begun to affect the production of the local staple. Unfortunately, however, while the facts are sufficiently clear, the inferences to be drawn from them are rendered doubtful by the impossibility of determining at the present time how far the variations that have occurred are due to the exceptional agricultural conditions of recent years.

4. In the decade preceding the late famine there had, on the whole, been a very considerable expansion in the area under cane, which reached its maximum limit in 1895–96, just before the famine. There was then in the two following years a decline, which can only be attributed to the disastrous seasons. In 1898–99 there has been a slight recovery.

5. The inference to be drawn from the recovery depends entirely on the question whether it was or was not as great as might be expected after the effects of the famine had passed away. The Director has little hesitation in answering this question in the negative, but the Lieutenant-Governor is not disposed at the present stage to consider this view to be fully established. It is true that the area in 1898–99 was below the average of the six years before the famine and much below the figures of 1895–96, but it was above the average of the decade preceding the famine. The Director suggests that this latter average is affected by the figures of earlier years when cultivation of cane had not reached what he considers to be now its normal standard ; but His Honour is not certain that a standard has yet been attained, and though the Director's inference is probable, he would not base conclusions on it. While, however, the figures for the Province as a whole may fail to afford conclusive proof of the Director's inferences, one significant fact in support of them emerges on an examination of the statistics in detail. The map* attached to the memorandum shows that the area under sugar-cane was less than the figures of the ten years' average in by far the greatest part of the Province. The falling off was, it is true, more than counterbalanced by a large increase in the two tracts in the north-east and north-west of the Province where the cultivation of sugar-cane is most profitable. But it is significant that where the profits from the industry are least, there the falling off of cultivation was greatest. The diminution of profits had its natural effect in a lessened area under the crop. The increase in Gorakhpur may be pointed to as an exception to this statement, but in that part of the country there is not the same production of refined sugar as elsewhere, and it is the trade in refined sugar that is most directly affected.

6. Allowing for the difficulty of determining the causes of the ascertained variations in cultivation, the inferences to be drawn from the memorandum may be stated as follows :—

(1) There has been a substantial decrease in the acreage under cane in those parts of the Province where the margin of profit on the cultivation is least, this decrease being probably due to the competition of bounty-fed sugar. Further experience is, however, required to arrive at certain conclusions in this respect.

(2) Foreign sugar does not as yet compete with *gur*, but it is now competing with refined sugar for home consumption, of which article it has seriously reduced the exports. It has also already caused the closure of numerous refineries, while it has seriously endangered the stability of others. The Director gives statistics showing that 120 refineries have stopped working, but his figures on this point are incomplete. He has since informed the Lieutenant-Governor that no less than sixty have been closed in a part of the district of Azimgarh alone, of which no account is taken in his memorandum.

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* Not reproduced.

(3) The price of refined sugars has been reduced about 12 per cent. in five years, and this decline has had a general lowering effect on all sugar prices.

(4) The closing of refineries must lead to a contraction in the acreage under sugar. This reduction might, if the refining industry were destroyed, reach a maximum of 250,000 to 300,000 acres. Such a reduction in the acreage under a valuable and paying crop would cause far-reaching injury to landlords, tenants, and the labouring population, and might affect the well-being of the rural classes to an extent that would produce serious discontent in the sugar-cane-growing regions. The stability of the Government revenue would be affected, not indeed directly, because the land revenue assessments are not ordinarily made on the special or crop rents that are in some places paid for land let out for a cane crop, but because the reduction of the profits of a valuable crop would impair the rent-paying capacity of the tenants, and thus cripple the resources of the landlords.

(5) The information available points to the probability of the further cheapening of the production of bounty-fed sugar in the future, to its importation in increasing quantities, and to the further under-selling of the native refiners.

(6) It is of much more importance to these Provinces to preserve their sugar industry on the basis of present arrangements than to have a cheap foreign sugar supplied to the consumers of the refined article.

(7) There is no prospect of native processes being so improved that refineries could hold their own against the foreign competition assisted by bounties.

7. While the Lieutenant-Governor thinks that further experience is necessary—possibly the current year's experience will suffice—to the formation of a clear and precise judgment as to the effects of the importation of foreign sugar on the indigenous industry, he is inclined to infer from the facts which have been stated above that in all probability the foreign competition has already begun to affect the native sugar industry; that it has probably already affected the cultivation of cane in the central and eastern districts; and that it is likely to produce continued and increasing injury both to the sugar industry generally and to the agricultural and labouring population of the cane-producing districts. This injury is undoubtedly the result of the bounty system, which enables foreign sugar to be profitably sold at a price below its cost of production and below the cost of manufacturing sugar in this country. It is submitted that the system is an arbitrary interference with the operation of the general laws of value, and that the removal of such a hindrance to freedom of exchange should be recognised as one of the duties of Government. The most satisfactory solution of the difficulty would be the abolition of bounties by international agreement, but there appears to be no probability that this consummation will be secured in any reasonable time, and the only alternative left to the Government is to protect itself by the imposition of countervailing duties. The effect of countervailing duties on the people of these Provinces would be precisely the same as an abolition of the bounties; in both cases the hindrance to free exchange on the basis of the cost of production price would be removed; and the price of the commodity would be left to be determined in accordance with the cost of production and the laws of supply and demand. The abolition of bounties has been generally admitted to be desirable, and action towards that end has already been taken by the Imperial Government. If, then, abolition should be impossible, the interests of this country would seem to call for the adoption of the alternative course. Sir Antony MacDonnell recognises that the interests of producers are in this matter necessarily opposed to those of consumers, but he considers that in this country, in which, as the Famine Commission has just shown, the labouring population are in a depressed condition,

and in which refined sugar is a luxury mostly consumed by the well-to-do, the injury caused by unfair competition in an important agricultural product is far greater than the corresponding advantages which this country derives ; and therefore that the effect of the bounties on the Indian sugar industries should be neutralized if their abolition cannot be secured.

I have, &c.,
J. O. MILLER.

Enclosure in No. 26.

From W. H. Moreland, Esq., Officiating Director of Land Records and Agriculture, N.-W. Provinces and Oudh, to Chief Secretary to Government, N.-W. Provinces and Oudh. No. 387/XIII–57, dated Lucknow, the 9th February, 1899.

I have the honour to forward the memorandum on the sugar question called for in G. O. No. 670/I–727B, dated April 7th, 1898. The information required by G. G. O. No. 15/48–3, dated October 31st, 1898, has been included as directed in G. O. No. 3590/I–727B, dated November 16th, 1898.

MEMORANDUM ON THE PROBABLE RESULTS OF INCREASED IMPORTS OF FOREIGN SUGARS.

Introductory Remarks.

In G. O. No. 670/I–727B, dated the 7th April, 1898, the preparation of a memorandum was ordered, to show, as far as information might be available, the extent to which imported sugar, both beetroot and cane sugar, was occupying the markets of these Provinces. A record was also required of statistics showing fluctuations in the imports and exports of sugar, crude or refined, and of the areas of cane under cultivation in the Provinces, and an enquiry into the comparative prices of imported and home-grown sugar.

2. Subsequently, G. O. No. 3590/I–727B, dated the 16th November, 1898, directed that the memorandum should include the information called for by the Government of India in G. G. O. No. 15/48–3, dated the 31st October, 1898. The information called for in this reference was as to the effect of the competition of imported sugars on the cultivation of sugar-cane, on the profits of such cultivation, and on those of the sugar industry ; also as to the possibility of any falling off in the land or canal revenues in consequence of the abandonment of sugar-cane cultivation.

3. This memorandum has therefore to furnish answers to both references, and as the subject-matters of the two overlap, it has not been found possible to follow the order in which the subjects of enquiry were prescribed. I have accordingly arranged the memorandum in the following order :—

I.—An examination of the statistics of cane cultivation in these Provinces.

II.—An enquiry into the home production of sugar.

III.—An examination of the statistics of imports and exports.

IV.—A study of the comparative prices of home and foreign sugar.

V.—An enquiry as to the extent to which foreign sugars are occupying the markets of the Provinces.

VI.—The effect of foreign competition on the profits of cultivation.

VII.—The effect of foreign competition on the profits of manufacture.

VIII.—An enquiry whether a decrease in cultivation is to be expected.

IX.—The probable results of a decrease in cultivation on the well-being of the people.

X.—The probable effects on the revenue.

XI.—Conclusion.

4. It may be well to explain at once that our trade statistics do not enable us to distinguish between cane and beet sugar ; and such a distinction is the less necessary because the people of the country do not recognise it. It never occurs to them that the foreign sugar can be made of anything else than sugar-cane, and if they are told that beetroot is used, their incredulity is obvious. A more important defect in the statistics is that they do not distinguish between home and foreign produce. The only way out of this difficulty is to treat the imports from the seaport towns as foreign sugar, and to class all other imports as home production. This is the course adopted and justified by the Cawnpore Chamber of Commerce in their letter of March 17th, 1898, and I have followed it throughout this memorandum.

5. The statistical information contained in this memorandum has been obtained from the various Departments concerned. The other information has been collected from a great variety of sources ; much of it is the result of enquiries made in all the principal centres of the industry by the Assistant Director, Saiyid Muhammad Hadi, M.R.A.C., who has taken up the question with great thoroughness and ability. A note embodying the results of his earlier enquiries is already, I understand, in the hands of Government.

I.—*The Statistics of Cane Cultivation in these Provinces.*

6. The statistics of cane cultivation from 1886–87 to 1898–99 are given in Appendix I. These figures are in general supplied by the patwáris, but it sometimes happens that the patwáris in some districts are engaged in survey operations, and are unable to furnish the actual figures. In such cases it is usual to repeat the figures for the previous year, so as to give an approximate total for the whole of the Provinces. The area affected in any year by these interpolations is not so great as to materially alter the provincial total, and the matter is only mentioned here because the accuracy of the detailed figures might otherwise be called in question.

7. The long period during which the cane occupies the land renders it necessary to explain that the year given in the appendix is that in which the crop is harvested ; thus, the area shown under the year 1895–96 is that which was sown in the spring of 1895 and harvested in the spring of 1896—that is, during the agricultural year 1895–96. Similarly, the crop shown under the year 1898–99 is that which is being cut at the time of writing.

8. The first point to consider is what period shall be adopted for the calculation of the normal area. There is no suspicion that the area in 1895–96 (the largest on record) was depressed by foreign imports, so the period to be selected will include it. The figures for the subsequent years require examination, as it has been alleged that the decrease in them is due to the competition of foreign sugar. I regard the period of 10 years as too long, because it is clear that cultivation was extending during this time, and to take the average of the whole would result in an under statement of the falling off which is apparent. It would ordinarily be desirable to take at least five years, but I prefer in this instance to take six, and consequently a fair average cannot be deduced from an odd number of years. I have therefore selected the six years 1890–91 to 1895–96 as the most suitable period.

9. The area sown in 1896–97 fell below this average by 56,131 acres, or 4·4 per cent. This fall could not be due to competition of foreign imports, because this competition had not begun in the spring of 1896, when this crop was sown

The decrease is, in fact, just what the figures of past years would suggest ; a fall was to be expected after the large rise in the previous year, and if the fall is greater by a few thousand acres than might have been foreseen, the reason is to be found in the local scarcity prevailing in Pilibhít and elsewhere at the time (the spring of 1896) when this crop was sown.

10. The crop sown in the spring of 1897 showed a further fall, and was 9·6 per cent. below the normal. This is not surprising, for at seed time almost the whole province was suffering from acute famine, and cultivators naturally put a larger proportion of their irrigable land under food crops. On the other hand the increase in imports was not at that time so marked as to affect the cultivators' calculations. When the whole *rabi* area was below the normal by about 24 per cent., when prices of grain were at least double the ordinary figure, and when cultivators' food stocks were running low, it is a matter for surprise that the cane area did not fall still further, and there is no need to look for other causes for the fall that took place.

11. It will be seen that the year 1898–99 is the first in which the competition of imported sugar could be expected to result in a decrease in the area of cane cultivation. Apart from this competition it would have been expected that the cane area would rise to something like the figures of 1895–96 ; but no such rise has taken place. The total for the province (including certain assumed figures) is 1,227,881 acres, an increase over 1897–98 of 79,782 acres (7 per cent.), but falling below the normal average by 42,279 acres, or 3·3 per cent. It is thus on the whole considerably below what might have been expected.

12. The different position in different districts is this year very marked, and requires a detailed consideration of the figures ; this will be found later on, as it could not be given here without anticipating some of the conclusions arrived at in subsequent sections.

13. Before leaving the cultivation statistics it will be well to show the relative importance of the cane crop to each division. As far as the area goes, this is shown in the following table :—

Division.	Average cultivated area in the six years 1890-91 to 1895-96.	Average area under sugar-cane in the same period.	Percentage of cane to total cultivation.
	Acres.	Acres.	
Meerut	4,414,801	253,831	5·7
Agra	3,753,555	59,091	1·6
Rohilkhand	4,390,924	301,422	6·9
Allahabad	5,209,170	34,374	0·66
Benares	2,783,191	156,761	5·6
Gorakhpur	4,103,117	197,394	4·8
Kumaun (Tarái)	200,801	4,958	2·5
Lucknow	4,172,548	128,603	3·1
Fyzabad	4,580,952	133,726	2·9
Total, North-Western Provinces and Oudh	33,609,059	1,270,160	3·8

The crop is most important in Rohilkhand, Meerut, Benares, and Gorakhpur ; least so in Agra and Allahabad, Oudh occupying the middle place in the table. Of all districts it is most important in Meerut, where the acreage averages more than a lakh ; it is between half a lakh and a lakh in Muzaffarnagar, Bareilly, Bijnor, Moradabad, Sháhjahánpur, Jaunpur, Gorakhpur, and Azimgarh : in other districts the acreage is below 50,000.

II.—The Home Production of Sugar.

14. Before examining the statistics of imports and exports it is desirable to get some idea of the amount of sugar actually produced in the Provinces. An enquiry of this kind is beset with considerable difficulty, and the figures in the following table must not be considered as more than a first approximation :—

Division.	Normal area under cane in acres.	Normal outturn of *gur* per acre in maunds.	Normal outturn in maunds.
Meerut	253,831	31	7,868,761
Agra	59,091	21	1,240,911
Rohilkhand	301,422	29	8,741,238
Allahabad	34,374	24	824,976
Benares	156,761	30	4,702,830
Gorakhpur	197,394	29	5,724,426
Kumaun	4,958	27	133,866
Lucknow	128,603	28	3,600,884
Fyzabad	133,726	28	3,744,328
Total ...	1,270,160	...	36,582,220

In this table the normal area is taken as the average of six years, as explained in the preceding section. The outturn of *gur* per acre has been calculated after consideration of all available materials. These consist partly of determinations made from time to time by Settlement Officers and former officers of this Department, but mainly of experimental cuttings carried out in recent years under the supervision of the Assistant Director. It has been necessary to consider the variation arising from the heterogeneous nature of some of the divisions: Meerut, for instance, includes the districts of Dehra Dún and Aligarh, the former more similar in conditions to the north of Rohilkhand or the Tarái, the latter approximating in sugar-producing capacity to the districts of Agra and Etah. Allahabad again includes all classes of land from the rich sugar soil north of the Ganges to the Bundelkhand districts where sugar-cane is almost unknown. In all such cases the average outturn has been calculated with due regard to the area occupied by the crop in each class of soil.

15. The outturn given is, if anything, lower than experimental figures would warrant: in cases of doubt I have taken the lower of two possible figures, as for the purposes of this memorandum it seems more important not to exaggerate the home production. The low outturn estimated for the Agra Division may perhaps give rise to criticism; it is the mean of several recent experiments conducted with great care, it is slightly above the figure given by experiments made some years ago, and its lowness is *à priori* justified by the sandy nature of the soil and the poor varieties of cane commonly grown in this division.

16. In fixing on *gur* as the standard of outturn I have not overlooked the fact that a large quantity of cane is used in the production of *ráb*, as an intermediate process in preparing refined sugars, and a lesser quantity is devoted to the manufacture of the raw sugar known as *shakkar*. *Gur* is taken as the standard because most of the cane is grown for its preparation and it is assumed, for statistical purposes, that all the cane-juice is made into *gur*.

17. Before accepting the normal outturn at the figure given in the table, one deduction is necessary. A certain proportion of the land under cane is occupied

by the *paunda* variety, which in these Provinces is not generally used for the manufacture of sugar, but is eaten as a fruit: the area devoted to this variety cannot be ascertained, but it is a small proportion of the whole, and after allowing for it and for possible errors in the estimate, I think the production of the Provinces in ordinary years may be taken as equivalent to 35,000,000 maunds of *gur*, worth from eleven to twelve crores of rupees.

18. The outturn of the years 1896–97 and 1897–98 fell considerably below this standard. In the former year the area occupied by the crop was below the normal by 4·4 per cent. The outturn (harvested in January and February 1897) was distinctly inferior and despite an excellent yield in the Meerut Division was not more than three quarters of the average in the Provinces taken as a whole. Taking these two factors into consideration, the produce of this year was about ten million maunds below the normal. The crop of 1897–98 was 9·6 per cent. below the average in area, but the outturn was good, so that the deficiency in this year was about three million maunds. In the two years combined the deficiency was about 13 million maunds.

19. It is much to be regretted that nothing is known as to the amount of refined sugar produced in the Provinces. The best estimate I can give is that about one-fifth of the raw sugar produced is refined, and four-fifths consumed in its natural state. This estimate (it is little better than a guess) is founded on what is known of the consumption of sugar among the people. The Upper India Chamber of Commerce estimate that the amount refined is one-third of the whole. I am not aware that they have better grounds for their opinion than I have for mine, and I daresay the truth lies between us. In this connection, the fact should be emphasized that the markets for raw and refined sugar are separate: this is a matter of custom and taste, and I do not assert that they must be separate, but merely that they are so at present. No matter how cheap refined sugar is, the great majority of the people will continue to use *gur*, and will not substitute refined sugar for it. The imports of foreign refined sugar do not therefore immediately threaten our whole home production but only our home-refining industry, leaving the demand for three-fourths or four-fiftns of our production unaffected.

III.—*Statistics of Imports and Exports.*

20. The statistics of imports and exports for the North-Western Provinces and Oudh are given in Appendix II., which is compiled from figures by the various railway administrations, the year running from April to March. The classification of this appendix into "raw" and "refined" sugar is not exactly in accordance either with European or native usage: the former treats as "refined" only that sugar which has undergone a special refining process; the latter regards all sugar as one class in contradistinction to the "raw" products *gur*, *ráb*, and *shíra*. As has just been pointed out, it is essential for the purposes of the present enquiry to distinguish clearly between "sugars" and crude products, since the markets are entirely distinct; and accordingly I have used the terms "raw" and "refined" in this sense. The classification in Appendix II. does not altogether agree with this usage, because in it cheap low grade sugars are occasionally treated as "raw." It has been impossible to obtain figures showing the essential distinction from all the railways concerned; but the inferences which are drawn later on from the statistics of inland trade are so rough that they will not be very materially affected by the difference. As regards the imports from seaport towns, however, it is of the utmost importance to make the distinction clear, in order to see whether they are threatening only our refining industry or are affecting also the much larger market for "raw" sugar. I have ascertained that with the exception of an insignificant amount of *gur* received from Calcutta, the whole of the imports from seaport towns classed as "raw" consists of sugar, and consequently compete not with our *gur* market, but with our refining industry. So far, then, there is no sign of any foreign competition in the *gur* market, and I do not expect to see it take place, at least in the immediate future; though it is conceivable that the stress of competition might ultimately drive the Mauritius planters to attack this large market. A palatable *gur* could hardly be made from beet.

21. Transferring, then, the "raw" sugars received from seaports to the head of "refined sugar," the figures in the Appendix may be summarized as follows :—

Class of Sugar.	Period.	Exports.	Imports.	Net Exports.
		Mds.	Mds.	Mds.
Raw sugars ...	Average of 11 years 1886-87—1896-97	3,885,484	211,413	3,674,071
	1897-98	4,015,723	343,442	3,672,281
	Difference ...	+130,239 or 3·4 per cent.	+132,029 62·5 per cent.	—1,790 ...
Refined sugars...	Average of 11 years 1886-87—1896-97	466,082	91,317	374,765
	1897-98	401,186	345,344	55,842
	Difference ...	—64,896 or 13·9 per cent.	+254,027 or 278·2 per cent.	—318,923 or 85 per cent.

This summary shows the general course of trade in these Provinces and the departures from it in the year 1897–98. As regards "raw" sugar, the Provinces are large exporters, the imports being relatively insignificant ; and the net export last year was almost exactly equal to the average. We are exporters on balance of refined sugar also, the average of 11 years being 374,765 maunds. But this balance almost disappeared in 1896–97 : our exports fell off by 14 per cent. and our imports increased by 278·2 per cent., so that our net exports fell by no less than 85 per cent. It is this sudden rise in imports which has brought the subject into prominence.

22. If we count three maunds of *gur* as equal to one maund of refined sugar, our total net exports in terms of *gur* average about 4,800,000 maunds ; or allowing for river traffic (which has not been registered until quite lately and is not included in these figures, but shows a considerable net export), we may put our net exports at about five million maunds or one-seventh of our total production. This estimate is of course very rough, and is given merely as an illustration of the relative importance of the amount exported to that consumed at home.

23. The next table shows our imports according as they come from other parts of India or other countries : it is calculated on the assumption that whatever we import from seaport towns comes from outside India ; the justification of this assumption has been already stated. As to the country of origin we have no information ; but I believe that on the whole rather more than half the total now comes from Germany and Austria, and the balance from Mauritius, these three countries contributing practically the whole supply. Until recent years, I believe Mauritius was almost the sole source, and beet sugar did not appear in any quantity till about 1890. In this table the imports are given for convenience in thousands of maunds :—

Class of Sugar.	Source of Imports.	1886–87.	1887–88.	1888–89.	1889–90.	1890–91.	1891–92.	1892–93.	1893–94.	1894–95.	1895–96.	1896–97.	1897–98.
Sugars competing with native refined sugar.	Foreign imports ...	57	52	43	32	161	103	42	84	62	116	92	344
	Inland imports ..	66	21	8	18	12	3	7	16	6	2	1	2
Sugar competing with native raw sugars.	Foreign imports ...	...	...	...	...	...	...	...	...	...	...	...	...
	Inland imports ...	280	151	154	216	215	189	219	262	157	236	246	343

From these figures it will be seen that the imports competing with our raw sugar for consumption have on the whole kept very steady : there was a sudden rise in 1897-98, but it was practically covered by a small increase in exports, and was due

probably to short stocks in particular localities arising from the deficient home produce in the preceding seasons. Our total imports of refined sugar also kept very constant with the exception of heavy imports in 1890-91. The average for the first five years amounts to about 70,000 maunds, and for the five years ending with 1896-97 to 80,000 maunds. During this period, however, sugar made abroad had entirely displaced sugar made in other parts of India, so that our whole imports are now derived from foreign countries. In 1897-98 these imports more than trebled, and the amount imported in that year represents rather more than one million maunds of raw sugar: that is to say, if no sugar had been imported, we should have had to increase our cane area by from 35,000 to 40,000 acres to supply consumption.

24. In order to bring the information as much to date as is possible, I give below a table showing the imports and exports for the six months, April to September, 1898, compared with the same period in the preceding year. The foreign "raw" imports have been transferred to the head "refined":—

—	Whence exported or to where exported.	Exports.		Imports.		Net.		Remarks.
		1897.	1898.	1897.	1898.	1897.	1898.	
		Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	
Refined sugar.	Seaports ...	1,790	4,632	159,044	165,710	157,254	161,078	Net import.
	Rest of India	165,243	336,069	878	1,538	164,365	334,531	Net export.
	Total ...	167,033	340,701	159,922	167,248	7,111	173,453	Ditto.
Raw sugar.	Seaports ...	3,517	5,854	...	...	3,517	5,854	Net export.
	Rest of India	1,079,123	1,374,608	113,302	109,985	965,821	1,264,623	Ditto.
	Total ...	1,082,640	1,380,462	113,302	109,985	969,338	1,270,477	

It will be seen that the imports of refined sugars from places outside India show a further rise from the abnormal figures of 1897, the rise in the six months amounting to over 4 per cent. Our exports, both raw and refined, were also increasing; we had more raw sugar to export owing to a good crop, and the increase in refined is due, I believe, to some dealers' stocks being forced on the market. But no inferences can be drawn from the figures of such a short period except that the foreign imports show no signs of diminishing.

25. The explanation of the great expansion in imports of foreign sugar is for two reasons outside the scope of this memorandum. In the first place I have not been asked for it; and in the second place, no adequate explanation of a phenomenon affecting the whole country can be drawn from the affairs of a single province. I have seen the following theories advanced to account for the rise: (1) unloading on the Indian market of bounty-fed sugar unsaleable elsewhere; (2) an abnormally good crop of beet flooding the European market; (3) an unexpectedly good crop of Mauritius sugar after arrangements had been made to supply the expected deficit by imports of beet; (4) the effects of the alteration in the currency law; (5) a short home outturn of sugar due to famine.

As regards the first three theories, I have nothing to say except that they are each relevant to the facts observed in these Provinces. The discussion of the fourth is obviously impossible in this memorandum. As regards the fifth, I have shown that in 1896-97 and 1897-98, the outturn of home-grown sugar was considerably short of the normal, and despite the reduction in consumption attributable to the famine, it is probable that some local imports were necessary to supply the defect.

26. In the absence of full knowledge of the foreign and colonial markets, I do not express my adherence to any of these theories. It seems not improbable that more than one of the causes enumerated—possibly all of them—have contributed to the result; but it is really immaterial what theory is adopted, for the important question for these Provinces is whether the foreign producers can continue to lay down sugar in our markets at the prices now ruling. What I have to say on this question will be found in section VIII.

IV.—The Prices of Home and Foreign Sugars.

27. It is very difficult to give any trustworthy figures comprising the prices of home and foreign sugar. The quality of the home sugars varies within very wide limits, and it requires expert knowledge to pronounce that any particular sample of home sugar is of the same grade as the imported stuff. The following table gives the best figures I have been able to obtain : it shows the wholesale prices (lowest and highest) ruling in the Cawnpore market in January of each year for two well-known kinds of home sugar and for such imported sugar as was being offered in the market. The prices are in rupees per maund of 48½ seers, the weight in which business is always transacted. The figures have been obtained from *The Merchant*, a weekly commercial paper published at Cawnpore :—

Description of Sugar.	1893.	1894.	1895.	1896.	Average, 1893—96.	December, 1898.
Dhoba Azimgarh ...	11·8 to 12·0	13·0 to 14·0	11·0 to 12·0	11·8 to 13·0	11·12 to 12·12	11·0 to 11·4
Sháhjahánpur *desi* ...	10·8 to 11·0	13·0 to 14·0	12·0 to 13·8	12·8 to 13·0	12·0 to 12·14	10·0 to 11·12
"Bombay" sugar ...	14·0 to 14·8	14·0 to 15·0	12·0 to 13·2	12·0 to 13·0	13·0 to 13·14½	...
Mauritius sugar ...	...	...	...	...	...	10·0 to 10·2
Beet sugar	...	...	...	...	...	10·2 to 11·4

The first two sugars in this table are made in these Provinces, and are representative respectively of the standard manufacture of the Eastern districts and the Rohilkhand Division. It will be seen that the prices now are materially lower than on the average of the years from 1893 to 1896.

28. During the years 1893-96 beet sugar does not appear in the quotations, and the only foreign sugar quoted is that called "Bombay" sugar. This was, I understand, cane sugar imported from Mauritius. The drop in Mauritius sugar is then very marked, amounting to about 25 per cent. The foreign sugars, both cane and beet, were selling in December as low as the inferior qualities of home sugar for which quotations are given.

29. The next table shows the prices of three varieties of home-made sugar : the figures have been obtained from a merchant on whose accuracy I can rely :—

Description of Sugar.	Prices per maund (48½ seers).				
	In 1894–95.	In 1895–96.	In 1896–97.	In 1897–98.	In 1898–99.
Sháhjahánpur *khánd*—	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
No. I.	13 8 0	13 8 0	12 12 0	12 8 0	12 0 0
No. II.	13 0 0	13 0 0	12 8 0	12 0 0	11 8 0
No. III.	12 0 0	12 0 0	11 0 0	10 0 0	10 8 0
Phulpur *pakki chini*—					
No. I.	13 0 0	12 12 0 and 13 4 0	12 5 0	12 2 0	11 8 0
No. II.	12 0 0	12 0 0	11 4 0	11 4 0	11 0 0
No. III.	11 8 0	11 8 0	10 8 0	10 4 0	10 0 0 and 9 0 0
Sháhganj *pakki chini*—					
No. I.	12 8 0	12 12 0	12 0 0	11 12 0	11 8 0
No. II.	12 0 0	12 0 0	11 0 0	11 0 0	11 0 0
No. III.	11 8 0	11 8 0	10 8 0	10 4 0	10 0 0 and 9 0 0

The Sháhjahánpur *khánd* is typical of the produce of Rohilkand; the *pakki chíni* of Phulpur and Sháhganj is representative of the manufacture of the Benares and Gorakhpur Divisions. Here, too, it will be seen that the prices show a great falling off, and that all except the very poorest classes are undersold by beet sugar.

30. Other figures could be given, but I consider these sufficient, as the whole sale trade of the Provinces is practically one market, and prices vary little in different localities. So far as I can judge, the manufacturer last year received from 10 to 12 per cent. less for his sugar than he was accustomed to.

31. As to retail prices, I can give no figures for the foreign sugars, mainly for the reason that their use is largely clandestine, as will be explained in the next section. It is too early in the season to say how prices will vary this year.

32. Before leaving the subject of prices it may be of interest to give the London prices of the beet sugar. In the following figures the prices are per cwt.:—

Description.	January 1893.	July 1893.	January 1894.	July 1894.	January 1895.	July 1895.	January 1896.	July 1896.	January 1897.	July 1897.	January 1898.	July 1898.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Beetroot—German, 75 per cent.	12 0	16 0	10 3	9 9	6 4	7 6	8 6	8 0	7 6	6 9	7 6	7 6
Beetroot—German, 88 per cent.	14 5	18 7	12 3	12 3	8 6	9 6	11 0	10 0	9 4	8 6	9 4	9 3

It will be seen that prices were very low at the time when the large imports into these Provinces commenced: they had been as low for a short period in 1895, when, however, exchange was much lower than has lately been the case.

V.—*The extent to which Imported Sugars are occupying the Markets of these Provinces.*

33. The following quotation from a note by Saiyid Muhammad Hadi, M.R.A.C., the Assistant Director of this Department, will show clearly the extent to which imported sugars are occupying the markets of these Provinces:—

> "*Khándsáris* (*i.e.*, native manufacturers of sugar), and such cultivators as usually convert their *gur* or *ráb* into refined sugar in their own little refineries, generally complain of harm being done to their trade by the free import and rapidly-increasing consumption of imported refined sugars in the country.
>
> "I have not come across a single *khándsári* who could distinguish the beet sugar from the imported cane sugar, and neither the *khándsáris* nor the native wholesale dealers know the difference between these two kinds of imported sugars. In the Eastern Districts and Oudh all imported refined sugars go under the name of '*Moris-ki-shakkar*,' which is obviously a corruption of the term 'Mauritius sugar.' In all other places, including Cawnpore, which is the chief centre of trade in foreign sugars, the two kinds of sugar are popularly known as '*Bambai-ki-shakkar*' or the 'Bombay sugar.' Indeed, I have failed in inducing even the Cawnpore dealers who import beet sugar in considerable quantities to believe that sugar could be manufactured from beet, and that the article they were selling was really sugar extracted from beetroot.
>
> "It is also a fact that imported cane sugar (refined) is being largely sold and consumed along with beet sugar. As no distinction can be made by dealers or consumers between the two kinds of foreign sugar, the harm alleged to have been done to the trade in native refined sugar is not attributed merely to the advent of beet sugar, but to that of imported sugars in general.
>
> "Generally speaking, the common cultivator who produces and sells raw sugar is not aware of the injurious effects on the native sugar trade of the increasing imports of beet sugar. Prejudice against all refined sugars (not *chini*, *i.e.*, ordinary native refined sugar), including Rosa and Káshipur, exists to a certain extent, both among Muhammadans and Hindus. The former use them more freely than the latter; but if they were absolutely certain that bone-black is used for refining these sugars, they would certainly abstain from consuming them. There is, however, no inquisitive tendency among the Muhammadans in this particular, and they therefore use the foreign

refined sugar without any scruples. Among the Hindus some societies have been formed in smaller towns, such as Bareilly, Sháhjahánpur, and Partábgarh, which have altogether prohibited their co-religionists from making use of these sugars, and in these places the *halwáis* (*i.e.*, confectioners) have been compelled, under the penalty of permanently losing their Hindu customers, not to introduce these sugars in the manufacture of sweetmeats. In the larger cities of the North-West Provinces and Oudh the use, so far, of the foreign refined sugars in the Hindu kitchen or for the preparation of sweet drinks is insignificant. Such sugars are used to a very considerable extent by *halwáis* in preparing sweetmeats. In Meerut, Lucknow, Agra, and Cawnpore at least 60 per cent. of the sugar used by the confectioner is of foreign origin. Jams, preserves, electuaries, and fruit syrups are now made chiefly with foreign sugars in all large towns. In Benares, which is an important religious centre of Hindus, a few *halwáis* abstain from using foreign sugars, and others pretend to do so in order to please their customers, although in reality they secretly make use of the imported sugars, which impart a superior appearance to the sweets they make. Foreign sugars are not used by Hindus or by *halwáis* in villages, but they are used by Muhammadans.

"I was most astonishingly struck this year with the extent to which the foreign sugars appeared to me to have taken the place of *chíni* for making *sarbat* in the Muharram festival in several small localities.

"Foreign refined sugars are not uncommonly used by *halwáis* for 'adulterating' (improving) inferior native sugars and furnish them with a source of practising fraud. A *halwái*, for example, buys second class *pakki chíni* and mixes it, say, with equal weight of powdered Bombay sugar. The mixture looks equal or superior to the ordinary first grade native *chíni*. He sells the mixture easily at a high price to people who abstain from the Bombay sugar.

"*Misri* (*i.e.*, a native refined sugar distinguished by the size of its crystals) is similarly prepared with 'Bombay sugar' and exposed for sale as 'native *misri*,' which is a far more expensive article. In Cawnpore the *halwáis* have begun to manufacture *bura* (*i.e.*, another form of native refined sugar) from foreign sugar, and the *bura* thus prepared is of course very superior in quality.

"So long as the foreign sugars sell at their present price, it is almost impossible to prevent the *halwái* from using them, because (1) he saves the time, trouble, and expense of clarifying (native sugars are always clarified before being used in sweetmeats); (2) the sweetmeats made with foreign sugars are very fascinating in general appearance.

"Foreign sugars are undoubtedly deficient in respect of sweetness as compared with native sugars. One and a quarter seer of 'Bombay sugar' would impart the same degree of sweetness to rice cooked with it as one seer of *chíni*. This is, however, an advantage to the *halwái* in one way, because in making sweetmeats with *khoya* (*i.e.*, milk coagulated by boiling), such as *pera* and *barfi*, he can put more of 'Bombay sugar' and less of *khoya* without making them too sweet, than if he were to use *chíni* as the sweetening agent; and *khoya* is twice as dear as sugar."

34. These remarks—the result of an exhaustive enquiry—show that imported sugars have succeeded in getting a footing in our markets despite the obstacles presented by the prejudices of the people. Since these remarks were written it has been ascertained that beet sugar is sold regularly in many smaller towns, such as Budaun, Bara Banki, Jaunpur, Partábgarh, Rae Bareli, and Kásganj; it is not therefore only the larger towns that are affected, but practically the whole market of the Provinces.

35. It will be seen that the prejudice against the use of bone-black in refining is not sufficient to prevent the consumption of foreign sugars in forms where the foreign origin is concealed. Nor can even the modified protection which exists at present be counted on in the future. Bone-black or animal charcoal is, so far as I am aware, still used for refining purposes in all the continental works; but it is a troublesome and expensive material, and efforts have for some time past been made to devise a substitute. These efforts are likely to be successful; in fact, I learn from a hand-book on the industry, published in Paris last year, that it is confidently anticipated that the use of bone-black will shortly be superseded by a new chemical process in which the purifying agent is hydrogen peroxide—a preparation to the use of which no prejudice can attach.

36. It is a somewhat striking fact that the existing prejudice has fastened exclusively on the use of the bone-black; for in making beet sugar it is usual to clarify by the use of bullocks' blood—a process which might be expected to give rise to even greater prejudice in the eyes of Hindus. However, in no case is it to be expected that the native refiner will receive permanent material protection from religious prejudices.

VI.—The Profits of Cultivation.

37. Before considering the effect of foreign imports of sugar on the profits of cultivating the cane, it is necessary to get some idea of the cultivators' profits. This is a very difficult matter, and the figures which I give below cannot from the nature of the case be more than a rough average estimate :—

Division.	Average Acreage under Cane.	Average Profit per Acre with *gur* at Rs. 3 4 0 per Maund.	Total Profit.
	Acres.	Rs. a. p.	Rs.
Meerut	253,831	30 0 0	76,14,930
Agra	59,091	7 0 0	4,13,637
Rohilkhand	301,422	20 0 0	60,28,440
Allahabad	34,374	16 0 0	5,49,984
Benares	156,761	15 0 0	23,51,415
Gorakhpur	197,394	12 0 0	23,68,728
Kumaun...	4,958	19 0 0	94,202
Lucknow	128,603	18 0 0	23,14,854
Fyzabad	133,726	18 0 0	24,07,068
Total, N.-W. Provinces and Oudh ...	1,270,160	...	2,41,43,258

The average profit per acre has been calculated on the following basis. The outturn is taken in terms of *gur* at the amount given in section II. of this memorandum, and the *gur* is valued at Rs. 3 4 0 per maund. From the income thus calculated are deducted the outgoings for seed, rent, cultivation, and boiling, the average cost of which item has been from time to time determined by this Department. The balance is the profit per acre. On these figures it may be said that the cash profit made by cultivators in the Provinces is something over two crores of rupees in an ordinary year. The crop is of most importance in Meerut and Rohilkhand, and after them in Oudh, Benares, and Gorakhpur. Its value in Agra and Allahabad is comparatively little. The figures for the Kumaun Division are very small, because the cane can be grown only in a small portion of the Naini Tal district—in this small area its importance is great.

38. The extraordinary divergence in the rate of profit will no doubt attract attention—the high figure for Meerut, and the low figures for Benares, Gorakhpur, and Agra are such as to give pause to the statistician ; and I have ventured to give them only after a long and careful examination of the foundations on which they rest. The high figure for Meerut is due to a combination of various causes, among which may be mentioned the large output resulting from good soil and good cultivation, the cheapness of irrigation, and the low cost of cultivation arising from the superior implements and cattle in use. The low rate of profit in the Agra Division is due mainly to the low yield, which (as already remarked) is to be attributed to unsuitable soil and poor varieties of cane. In Benares and Gorakhpur the cost of irrigation is very high and the methods of cultivation are expensive.

39. These estimates assume that all labour is paid for in cash ; and no other exact method of calculation is possible. But what makes the crops so profitable to the industrious cultivator is that most of this labour is performed by himself and his family, and his profits are accordingly higher than those just given by the considerable amount thus earned as wages. In addition to this, it must be remembered that work on this crop comes just at times when ordinary field work is slack ; an opportunity is thus provided for profitable labour when it would otherwise be wanting.

40. If we assume that the cultivator uses nothing beyond his own labour and capital throughout the whole process, *i.e.*, that he owns the necessary bullocks and implements, has free use of a well, owns a crushing mill and boiling plant, that he and his family prepare the ground, plant, cultivate, water, pick, clean, crush, and boil without any outside assistance, his profit (including wages) would be increased by from Rs. 25 to Rs. 60 an acre. This case is perhaps almost as rare in practice

as the converse, where he is supposed to hire everything; and the cash return of the crop lies somewhere between the two estimates, differing from cultivator to cultivator and varying over the Provinces from Rs. 30 to Rs. 90 on the acre. I know of no crop which grown on the same scale would yield such profits, and there is little doubt of the correctness of the general opinion in this matter.

41. It is obvious then that no particular price of raw sugar can be assigned as the limit of profitable cultivation. A fall to Rs. 2 8 0 per maund would annihilate the profit of those cultivators who hire all their implements and labour; while some might be content with their earnings (there would be no profit in the strict sense), if they sold their *gur* for half this sum. The price of *gur* at the time of writing shows a marked fall from the figures of the past few years; but it is too early in the season to draw any inference from this fact. All that can be said is that as the price falls the profits of all cultivators will diminish, and that those will be the first to abandon the crop who pay large sums in wages, while those who employ fewest labourers will be able to hold on longest. The probability of a fall in the price of raw sugar will be shown in the two following sections.

VII.—The Profits of Manufacture.

42. If it is difficult to estimate the profits of the cultivator, it is not more easy to calculate those of the refiner or *khándsári*, who buys raw sugar or cane-juice from the cultivator and converts it into *chíni* or *khánd* (which are classed as native refined sugar), and *shíra* (molasses). The further stages by which the high class sugars (such as *misri*) are produced are really branches of the confectioner's art, and I do not propose to consider them.

43. For the refiner or *khándsári* I am in possession of figures showing the estimated profits in several districts; but such estimates are of necessity highly conjectural, and it will be sufficient to state generally that the profits average about 10 per cent. when prices stand as they did last season, refined sugar being about Rs. 9 per maund of 40 seers (or Rs. 10·14 per maund of 48½ seers), and the raw sugar used in the manufacture at Rs. 3, which is equivalent to *gur* at Rs. 3 4 0. The profits depend almost entirely on the prices of the raw material and the finished products; for the cost of raw material is about five-sixths of the outlay.

44. On the whole, then, as far as prices show, the native refiner cannot say that his profits per cent. have vanished, though they are not by any means above the ordinary run of profits when it is remembered that they include earnings of the refiner's own work. But the truth seems to be that the prices of home sugar are not true market prices. Much foreign sugar has (as already shown) displaced the home product, and refiners have therefore been unable in many cases to sell their stock. Thus it was found in June last that about four-fifths of the season's produce of refined sugar in Rohilkhand was still on the refiner's hands. They could not dispose of it at the prices ruling, and if they had thrown it on the market they must have depressed prices so far that no profit at all would have been left. Enquiries just made show that a considerable proportion of last year's stock is even now in the refiner's hands, though the new season's work has begun. Some investigations I have lately made in the Etah district show that here, also, some of last year's stocks are still on hand where they have not been got rid of at ruinous prices. Thus the prices I have quoted for native refined sugar are not prices at which the refiners can sell their whole stock, but have been maintained only by holding large stocks off the market. This of course cannot be done indefinitely, and there is no doubt whatever that if foreign sugars continue to be sold at the present prices, a large number of refineries will be closed, and the demand for raw sugar will fall off accordingly.

45. The following facts reported by the Assistant Director show that the ruin of refineries has begun. In Partábgarh three factories out of 32 have been closed, in Benares two out of 55, and in Jaunpur 32 out of 535. In Sultánpur 14 factories have been closed; and in Gházipur and Gorakhpur 37. That is to say, 120 refineries were closed in the eastern half of the Provinces during last season. In Rohilkhand, actual closures were not discovered; but a large number of factories were found to be on the verge of ruin.

46. I need not refer here to the evidence given by the income-tax returns except to point out that the losses incurred will not affect the assessments of 1898, but only those of 1899, and that the full effect will not be visible in that year.

VIII.—The possibility of a Decrease in the Cultivation of Sugar-cane.

47. The conclusions arrived at in preceding sections give the necessary material for discussing this the most important subject of this memorandum. We have seen that the foreign imports have so far had a most injurious effect on the business of the native refiner, but that they have not competed directly with the form of sugar in which the larger portion of the local production is consumed.

48. The loss of profits in the refining trade must necessarily tend to reduce the area under the crop. Its action would ordinarily proceed in the following way. Refiners will buy less raw sugar : the lessened demand for raw sugar will cause a fall in its price : the cultivators receiving less money for their produce will get less profit, and where their profit is already small, some of them will find the business less profitable than the growth of other crops : they will therefore reduce the area under cane ; this process will go on till the produce of the reduced area will not be more than sufficient to meet the reduced demand, when the price of raw sugar will be readjusted at a point lower doubtless than the former equilibrium—which will yield a profit that the cultivators think adequate. The result of this process will be that where, as until lately, we grew enough cane to supply our markets with raw and refined sugar, we shall, when things have settled down, grow enough to supply our markets with raw sugar and with a much lesser quantity of the refined article.

49. It is obvious that this proceess will take some time, and that the full effect on cultivation will not be produced in one or two years ; but there is a trade custom which will in some parts of the country materially accelerate the process. It is usual for the *khándsári* (refiner) to give advances to cultivators to meet the heavy cost of growing the cane, the juice when ready being made over to him at a fixed price. Some *khándsáris*, who in any year find their business unprofitable, will probably decrease the amount of their advances, and the decrease in cultivation will begin to appear in the next season.

50. The statement made in paragraph 48, that the loss of profit must necessarily tend to reduce the area under the crop, involves two assumptions deserving of special notice. In the first place it is assumed that the trade in foreign sugar pays, and will continue to pay, at the prices now prevailing. The assumption is permissible as it appears from the latest returns that the trade continues to expand ; but it is at variance to some extent with those theories (enumerated in paragraph 25) which regard the foreign imports as an altogether temporary phenomenon. Without entering on a discussion of these theories, the following facts may be mentioned as indicating that the price of beet sugar in free markets is more likely to fall than to rise :—

(1) It is commonly said—and with good reason—that the Continental Powers are more likely to increase bounties than to reduce them, so long as the remaining free markets of the world do not impose countervailing duties.

(2) The United States are beginning to produce beet sugar on a considerable scale. There is an enormous area in the States fit for growing beet, and my latest information is that nine factories are profitably at work and that large capital is being sunk in others. American papers which I have seen look forward to the time when America will export beet sugar after providing for the whole wants of her population ; and the Director of the Chemical Division of the United States Agricultural Department wrote in 1897 that "the demand for sugar promises to be the salvation of American agriculture." These forecasts may be too sanguine ; but it is obvious that the extension of the industry in the States will affect the price

of beet sugar in all markets. It will also directly affect cane sugar, for Mauritius still exports a large quantity to America, and if that market is lost, will probably try to sell more in India, thereby increasing competition.

(3) Efforts are being made to resuscitate the West Indian cane sugar industry by the introduction of the latest machinery and the application of fresh capital: if they succeed, competition will be still further accentuated.

(4) The process of beet sugar manufacture is not yet perfect, and efforts are being constantly made to improve it in various directions. As an instance, I may refer to the possible supersession of the bone-black process, to which reference has already been made. Any fall in the expenses of production due to improved processes must necessarily give the continental manufacturer an increased advantage in our markets.

On the other side, I know of no cause which is likely to raise the price of foreign sugar, unless such action is taken by the consuming countries as to lead to an abolition of the bounties.

51. The second assumption is that cultivators and manufacturers in these Provinces will not so improve their processes as to enable them to meet foreign competition on more equal terms. This assumption is justified by all the experience of this Department. It is true that improvements are possible in almost every stage of the process; but it is not by any means certain what processes are best suited to the country and the people. Enquiries having some bearing on this matter have been going on for some time; but the accumulation of results is a slow process when the native producers stand aside and leave the whole work to Government Departments. And when improved processes have been devised, their introduction among the people takes a far longer time; so that the trade would be ruined before the new processes could obtain a footing. If by the imposition of countervailing duties, time were given for new processes to be worked out and introduced, it is possible that we might so strengthen our position as to be ready ultimately to meet foreign competition even aided by bounties on more equal terms; but with competition already active, and new processes still in embryo, the result cannot be doubtful.

52. Subject then to these assumptions, there is a reasonable degree of certainty that the area under cane must decline. It is difficult to assign any limit to the possible decline. If foreign manufacturers should compete successfully with our production of *gur*, it is possible that the area under sugar-cane would be very materially reduced; but, as I have already said, I do not expect this competition to arise. If, on the other hand, the competition is limited to our refined sugar, the decrease in cultivation may possibly extend to, but cannot exceed, that proportion of the total area which is devoted to the production of sugar for refining. I have already explained that no information can be given at present as to this proportion; the best guess I can give is something between one-fifth and one-fourth of the total, or say 250,000 to 300,000 acres as the limit.

53. Two general propositions may be stated regarding this decrease: it will not occur uniformly in all parts of the Provinces, and its full extent will not be manifest at once. The considerations affecting the distribution of the decrease are as follows:—

(1) The decrease will on the whole be greatest where the cash profits are least.

(2) The decrease will on the whole be greater where much of the labour is paid for in cash; and less where the cultivator and his family do most of the work.

(3) The decrease will on the whole be greater where refining is a recognised business than where most of the *gur* is consumed unaltered.

The first and second considerations follow directly from what was said in section VI., regarding the cultivator's profits. It is obvious that when the cultivator comes to decide whether or not he will plant sugar-cane, he will be influenced largely by the profits made by himself or his neighbours during the past year: and these profits depend at any given price of *gur* on what I have called the "cash profits" added to the earnings of the family. When, then, the price of *gur* falls, profits will tend to disappear first where the earnings of the family are relatively small; and where the proportionate earnings of the family are equal in the cases compared, the total profits will vary with the cash profit. The third consideration also is a direct deduction from the circumstances; where refining is practised on a large scale, the cultivators will be affected directly by the refiner's demand for raw sugar, and will quickly feel any decrease in it; on the other hand where there are few refiners, their demand will not have the same importance, and production of *gur* will be continued to meet the consumer's demand.

54. A decrease, then, in cultivation will be unevenly distributed over the Provinces: the Meerut Division will be least affected, having high profits and comparatively little refining. The Benares Division (including the Azimgarh district) will perhaps suffer most, as profits are low and the refining industry is most important. South Oudh and the Agra and Allahabad Divisions will be rather less affected: and North Oudh and Gorakhpur will suffer comparatively little. It is difficult to say what effect may be expected in Rohilkhand: the refining industry is most important about Bareilly and Sháhjahánpur; but, on the other hand, the crop is fairly profitable. Probably, Rohilkhand would show a decrease in cultivation; but it would not be serious. No inference can be drawn as regards any large area from the second consideration: the proportion of home to hired labour does not, so far as I know, vary greatly from district to district, and the consideration becomes important only when attention is given to the danger of decrease in particular villages.

55. As regards the second proposition, it is necessary to consider the effect of (1) village and (2) trade custom. Village custom will tend to retard decline in cultivation; that is to say, where cane cultivation is carried on as a matter of course by many cultivators, they will be slow to change their habits on the result of one or two unprofitable years; but where the cultivation is confined to a few of the more enterprising villagers, there will be less inertia, and falling profits will produce a more rapid effect. The trade custom is that which I have already mentioned of advances given by refiners to meet the cost of cultivation. Where it is in force, cultivation should respond rapidly to fluctuation in refiners' profits.

56. Taking the two propositions together, a decrease in cultivation due to foreign competition with refiners would be most marked in the first instance in the Agra, Allahabad, and Benares Divisions and in the district of South Oudh. It would be distinct in Rohilkhand, and would hardly extend to the districts north of the Gogra. The Meerut Division would not be affected for some time, if at all.

57. Having now stated the limits of possible decrease in the Provinces, and the localities where it may be expected to occur, it remains to examine the figures for 1898–99, the consideration of which was postponed in paragraph 12. It may be repeated that this year would in the ordinary course have shown a large rise above the average; and therefore comparison with the average understates decreases and overstates increases. The most important qualification should be borne in mind during the discussion that follows.

58. Leaving out of account six districts for which no figures are available, and the hill districts (Garhwál and Almora) where cane is not grown, the following table compares the area of cane in 1898–99 with the averages of (1) the 10 years 1886–87 to 1895–96; (2) the six years 1890–91 to 1895–96. I have already given my reasons for preferring the short period average; but in the case of several districts it is vitiated by the number of interpolated figures, and it

becomes necessary to use the long period average. This course tends to obscure the effect of the general rise in cultivation between 1886 and 1896, and therefore decreases are again understated and increases overstated.

District.	Area in 1898–99.	Average of ten years, 1886–87—1895–96.	Difference.	Per-centage.	Area of six years 1890–91—1895–96.	Difference.	Per-centage.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Dehra Dún	879	1,474	—595	—40·3	1,503	—624	—41·5
Saháranpur	48,718	41,486	+7,232	+17·4	42,211	+6,507	+15·4
Muzaffarnagar ...	83,252	65,649	+17,603	+26·8	68,967	+14,285	+20·7
Bulandshahr	31,037	22,140	+8,897	+40·2	26,666	+4,371	+16·4
Aligarh	5,391	3,674	+1,717	+46·7	4,123	+1,268	+30·7
Muttra	2,374	1,345	+1,029	+76·5	1,531	+843	+55·1
Agra	1,693	3,805	—2,112	—55·5	3,694	—2,001	—54·2
Farukhabad	12,059	18,427	—6,368	—34·6	19,362	—7,303	—37·7
Mainpuri	8,758	10,218	—1,460	—14·3	10,800	—2,042	—18·9
Etáwah	9,344	10,075	—731	—7·3	9,882	—538	—5·4
Etah	14,287	14,498	—211	—1·5	13,820	+467	+3·4
Bijnor...	73,252	68,624	+4,628	+6·7	60,769	+3,483	+5·0
Budaun	18,905	22,390	—3,485	—15·6	(a)	...	...
Moradabad	54,521	56,383	—1,862	—3·3	60,014	—5,493	—9·2
Cawnpore	8,421	10,097	—1,676	—16·6	10,864	—2,443	—22·5
Fatehpur	3,044	5,053	—2,009	—39·8	5,261	—2,217	—42·1
Bánda	6	33	—27	—81·8	28	—22	—78·6
Hamírpur	1,149	3,149	—2,000	—63·5	2,657	—1,508	—56·8
Allahabad	10,425	13,298	—2,873	—21·6	13,767	—3,342	—24·3
Jhánsi	353	1,337	—984	—73·6	(a)	...	...
Jalaun	375	1,167	—792	—67·9	769	—394	—51·2
Benares	18,900	20,885	—1,985	—9·5	21,407	—2,507	—11·7
Mirzapur	8,125	11,183	—3,058	—27·3	10,904	—2,779	—25·5
Jaunpur	46,154	53,645	—7,461	—14·0	54,178	—8,024	—14·8
Gházipur	28,389	33,979	—5,590	—16·5	33,247	—4,858	—14·6
Ballia	37,355	36,982	+373	+1·0	37,025	+330	+0·9
Gorakhpur	80,527	71,762	+8,765	+12·2	73,488	+7,039	+9·6
Basti	50,373	41,503	+8,870	+21·4	45,737	+4,636	+10·1
Azimgarh	62,439	78,063	—15,624	—20·0	78,169	+15,730	—20·1
Naini Tal	3,251	5,168	—1,917	—37·1	4,958	—1,707	—34·4
Lucknow	2,713	4,474	—1,761	+39·4	(a)	...	...
Unao	8,061	16,304	—8,243	—50·6	(a)	...	..
Rae Bareli	2,620	5,204	—2,584	—49·7	(a)	...	...
Sitapur	29,640	30,485	—845	—2·8	(a)	...	...
Hardoi	17,831	27,610	—9,779	—35·4	(a)	...	...
Fyzabad	46,195	40,771	+5,424	+13·3	(a)	...	...
Gonda...	25,704	20,348	+5,356	+26·3	23,037	+2,667	+11·6
Sultánpur	21,828	20,510	+1,318	+6·4	(a)	...	...
Partabgarh	11,674	12,989	—1,315	—10·1	(a)	...	...
Bara Banki	23,082	26,916	—3,834	—14·2	(a)	...	...
Total	913,104	933,103	—19,999	...	747,838	...	...

(a) Six years' averages vitiated by interpolations.

Out of these 40 districts the area under cane falls below the average in 28, the deficiency amounting to 91,211 acres ; the remaining districts show an aggregate increase of 71,212 acres, so that on the whole these 40 districts are just 20,000 acres below the 10 years' average in a year when the area would be expected to rise well above it. These facts suggest that some general cause has been at work to reduce the area under the crop.

59. A glance at the accompanying sketch map* shows that the districts with increased cultivation lie in two groups on the north-west and north-east of the Provinces. The first is made up of the Meerut division (excluding Dehra Dún) with the adjoining districts of Muttra and Bijnor. Bijnor with its small increase ($6\frac{1}{2}$ per cent.) occupies an intermediate position between the high increases on the west and the decreases on the south and east. The Muttra figures are very small, and there is probably some special cause there to account for the high percentage

* Not reproduced.

of increase. The north-east group comprises Gonda, Basti, Gorakhpur, Ballia (nominal increase). and Fyzabad ; with a small increase (6 per cent.) in Sultánpur, which fits in with no theory. The rest of the Provinces show a considerable decrease, except in the case of Etah, where the area is just about normal. I have ascertained that the total cultivated area in this district extended very largely during the year, and much of the cane crop was grown on the recovered fields ; but for this fact there would have been a larger decrease.

60. An examination of the map* shows that it is not unlike a map showing the incidence of the recent famine : there are the prosperous districts on the north-east and north-west, the general depression over the rest of the Provinces, and the acute depression in Bundelkhand and round Lucknow. Such a resemblance can hardly be accidental, and it suggests that even now the figures show the influence of famine. The last-mentioned districts had (to go no further back) no kharíf in 1896 : a bad rabi in 1897 : and a good 1897 kharíf : so that when the time came for deciding whether to grow cane, there had been only one good harvest to replenish food stocks, and it is quite conceivable that many cultivators put off growing cane till they should have a better stock of necessaries. There was also some difficulty in getting cuttings for seed where the area had been very small in the previous year. On the other hand, cultivators probably at that time needed a crop to give a good cash return, and this would have tended to extend the cane area.

61. This, then, is one possible cause for the decrease this year. But it must be noted that the decrease can also be regarded as the result of a decline in refiners' profits, for its distribution is very much what has been predicted a few paragraphs back as the result of that cause. There is a marked increase in Meerut : a small but distinct decline in the Rohilkhand Districts for which we have figures : a decline nearly everywhere else except north of the Gogra, and in one or two exceptional districts.

62. There are, then, two possible causes : my opinion is that both of them have contributed to the result ; that the very marked decrease in Bundelkhand and in the neighbourhood of Lucknow is due largely to the after effects of the famine, but that a part of the decrease in these localities, and a larger part of it elsewhere, marks the beginning of the decline which is expected on theoretical grounds as the result of increased imports. This, however, is at present an opinion only ; the two causes can be tested only by the figures for future years. If the decrease was due to the famine, the recovery in this and the following year should be very marked : if the famine had no effect on the 1898 area, there should be now little or no recovery. My conclusions, therefore, are that a decrease in cultivation is sure to result, and that the process has probably begun ; but proof of its existence is not yet complete. A supplementary note will be prepared as soon as the areas for the present year can be ascertained.

IX.—The Results of a Decrease in Cane Cultivation on the Well-being of the People.

63. In order to estimate the effects on the revenue of a decrease in cane cultivation, it is necessary to state its effects on the well-being of the people. I have therefore prepared the following summary of the probable results on the classes of the community who are more particularly concerned.

64. The consumers of refined sugar, *i.e.*, the upper and upper middle classes, will get what they want at a lower price than before. This follows necessarily from the assumption that the decrease in cultivation is due to a fall in price of the refined article. Refined beet sugar is on the whole at least as good an article as the stuff locally manufactured. It is generally said to be deficient in sweetening power, but, on the other hand, it is much cleaner and purer. The great mass of the people who consume only raw sugar will not benefit.

65. The manufacturers of refined sugar will lose their business. Their specialized capital will be lost, as well as their knowledge and technical skill.

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* Not reproduced.

66. The individuals or firms, European and native, who have invested large capital in crushing mills which are let out for hire, will also lose some of their business, and some of their capital will be rendered useless.

67. The cultivator will lose the extra profits which he obtains from the crops ; he will lose also an opportunity for the remunerative employment of the labour of his family.

68. The landowner will lose in rent—directly, where he now levies a special rent on the crop, or where its loss leads to a reduction in the rent of land that is specially suited for growing it ; indirectly, by the impoverishment of the cultivator, who will be less able to pay his rent in unfavourable seasons.

69. Of all classes it is, perhaps, the agricultural labourer who will suffer most ; for decrease in cane cultivation means a decreased demand for labourers at a time when the demand for other field work is very slack. This must mean that where cultivation falls off extensively the labourers will get work for fewer days in the year than is at present the case, and fewer days' work means fewer days' pay. It is also noticeable that, as I have tried to show in paragraph 41, the chief decrease in cultivation will take place on that land where most hired labour is employed. I would lay special emphasis on this point, for while manufacturers and landowners can always make their grievances heard, the labourer has no machinery for agitation, and must suffer in silence.

70. It is not altogether irrelevant to point out briefly some effects on the social life of the people which may be produced by a large decline in cane cultivation. There are almost innumerable social and religious customs bound up with the cultivation, the loss of which would appreciably diminish the happiness and brightness of village life, and might, under certain circumstances, give rise to a feeling of uneasiness or discontent that the mere money loss would be powerless to create. In particular, the mendicant class will be sufferers, for special charities are by custom incumbent on the owner of a good cane crop, and these special charities are among the principal resources of the mendicant community.

X.—*The Results of a Decrease in Cultivation on the Revenue.*

71. If the cultivation of sugar-cane falls off, the land and canal revenue may be affected, while the income tax will be affected by the ruin of the refining industry. There may also be some effect on the excise revenue, as the supply of molasses for distilling will fall off, but this need hardly be discussed in detail.

72. First as to the land revenue. Here it is necessary to distinguish between old and new settlements. The former will not be appreciably affected, for though the rent-paying power of the cultivators, and consequently the revenue-paying power of the landowners, will be diminished, the ordinary progress of the country will be found to have so increased the landlords' resources that, as a rule, they will be able to bear the loss. Special cases may, of course, occur where the loss of this crop will prove to be the proverbial last straw, and will precipitate the ruin of an embarrassed proprietor, or where a village contains a large area of low-lying heavy soil good for cane growing, but unfitted for other crops ; but there is no likelihood of any general breakdown of settlements. The loss in such cases will come in when the settlement is revised in the ordinary course. The possible enhancement will be seriously diminished by any marked decrease in the area under cane, but no forecast can be given of the amount that will be lost.

73. Next as regards the more recent settlements. These have been made on the basis of actual rentals, and I believe I am correct in saying that, as a rule, special crop rents on cane have not formed a large portion of the accepted rental. Where rents are already high, as in parts of Southern Oudh, the loss of the crop may lead to their reduction ; but I should not expect this to occur on such a scale as to render any revision of assessment necessary. The real effect will be to diminish the margin which has been left for the landowner, and to impoverish the cultivator, so that there will be greater difficulty in collecting the revenue, and when bad seasons come the need for remissions and suspensions will be increased.

74. It must, however, be remembered that the Benares Division, which may be expected to show a large proportion of any decrease that occurs, is held under permanent settlement, and there should be little effect on the revenue, disastrous as a decrease would be to the small cultivators who hold so much land under the privileged tenants. Leaving this Division out of account, the risk of loss would appear to be greatest in the southern districts of Oudh.

75. Thus the effect on the land revenue of any such decrease in cultivation as is likely to occur will be mainly indirect. With the income tax the case is different; here the direct loss can be measured by the amount of tax at present paid by the sugar refiners, diminished by whatever these people may be expected to earn in other occupations. In estimating this offset it must be remembered that the aggregate amount of capital in the trade is considerable, and some of it is specialized in forms which are not available for other purposes, while much is likely to be lost before business is finally abandoned. I do not give the amount of tax paid by the industry, as the return in which it is shown is confidential.

76. In order to estimate the loss of canal revenue, the following figures have been calculated from material supplied to me by the Irrigation Department :—

Canal.	Average Sugar-cane area watered 1893–94 to 1895–96.	Average rate per acre.	Revenue.	Average rate of rabi irrigation per acre.	Revenue of area in Column 2 if watered at rabi rates.
1	2	3	4	5	6
	Acres.	Rs.	Rs.	Rs.	Rs.
Ganges Canal	116,491	6	6,98,946	2·65	3,08,701
Lower Ganges Canal	23,499	6	1,40,994	2·35	55,223
Eastern Jumna Canal	49,214	6	2,95,284	2·73	1,34,354
Agra Canal	6,187	6	37,122	2·67	16,519
Betwa Canal	502	6	3,012	2·39	1,200
Dún Canal	1,045	6	6,270	2·21	2,309
Rohilkhand Canal	13,612	2·4	30,627	0·67	9,120
Bijnor Canal	2,657	2·4	5,978	0·95	2,524
Total	213,207	—	12,18,233	—	5,29,950

The average area of cane irrigated is calculated for three years from the date of enhancement in the rates charged on the larger canals. In these years the average area was 213,207 acres, which brought in Rs. 12,18,233 of revenue. If this land had been under ordinary crops, and had been irrigated in one rabi season out of the two needed for sugar-cane, the revenue would have been Rs. 5,29,950, showing a loss of Rs. 3·2 per acre. If two rabi crops were taken in successive years the income would be Rs. 10,59,900, and the loss per acre about Rs. 0·7. In practice some of the land would yield two rabi crops and some one, so the loss would be something between R. 1 and Rs. 3 an acre, and might be roughly estimated at Rs. 2. As already shown, the decrease in cultivation would affect the Meerut (Revenue) Division less than any other part of the Provinces; and as the irrigation from the Eastern Jumna and most of that from the Ganges Canal lies in this Division, the canal-irrigated area under sugar-cane would, on the whole, fall much less rapidly than the total cane area of the Provinces. The yearly loss, if the crop was entirely discontinued, would be about four lakhs; if cultivation decreased by one-fourth, the loss would be one lakh. I do not think there is any likelihood of its reaching this figure unless the *gur* market be interfered with.

XI.—Conclusion.

77. The result of this inquiry, then, is that the imports of foreign sugar threaten the home refining industry, and, through it, one-fourth or one-fifth of our cultivation. It cannot be considered proved that a decline in cultivation has

already begun ; but there are strong indications that this is the case. Should the decline ensue, there will be little direct effect on the revenue ; but the economic result to the people, and especially to the labouring classes, will be disastrous, and the impoverishment of the people must react on the revenue. The only classes who would appear to benefit by the change are the confectioners who use foreign sugars clandestinely, and are enabled, if so minded, to cheat their customers ; and the upper or upper middle classes who get an advantage so small that probably they scarcely perceive it. It is this distribution of the benefits and the drawbacks that puts these Provinces on an entirely different footing from the United Kingdom, where the benefits of cheap sugar extend to the very poorest classes, and only a few refiners or capitalists suffer. So far as these Provinces are concerned, there could be no practical objection to countervailing duties on all sugars on which a bounty has been given ; this would not exclude Mauritius sugars, which alone would not force down prices so as to ruin the refiners. Even though the danger of loss to the country is not so great as some writers have assumed, there is no reason why we should incur any loss at all when there is a remedy at hand, the application of which will cause no serious injury to any class of the community.

These remarks, it should be understood, are based on a consideration of the circumstances of these Provinces ; possibly there may be some parts of India where cheap sugar is an important gain to the community as a whole ; but, so far as I can judge, the economic gain resulting from bounty-fed foreign sugar in these Provinces is infinitesimal, and the economic loss is likely to be widespread and serious.

W. H. MORELAND,
Officiating Director.

APPENDIX I.—*Showing the area under Sugar-cane cultivation in the Divisions of the United Provinces from* 1886–87 *to* 1898–99 *in acres.*

Divisions.	1886–87.	1887–88.	1888–89.	1889–90.	1890–91.	1891–92.	1892–93.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Meerut	200,046	223,784	246,352	202,129	228,208	281,171	225,716
Agra	49,300	63,400	71,757	44,686	44,270	56,588	61,421
Rohilkhand	260,198	269,867	289,951	257,702	247,188	313,283	293,062
Allahabad	35,087	37,540	35,672	26,798	29,688	36,702	37,407
Benares	147,027	162,877	161,108	155,169	149,006	168,123	153,719
Gorakhpur	173,772	196,674	178,967	179,509	177,118	206,045	185,215
Kumaun	4,925	6,228	6,089	4,692	3,743	5,325	5,399
TOTAL, N.-W. PROVINCES ...	870,355	960,370	989,896	870,685	879,221	1,067,237	961,939
Lucknow	95,344	108,901	117,664	103,172	103,937	144,821	116,827
Fyzabad	94,763	122,820	120,560	110,146	120,853	150,676	130,444
TOTAL, OUDH ...	190,107	231,721	238,224	213,318	224,790	295,497	247,271
TOTAL, N.-W. P. AND OUDH	1,060,462	1,192,091	1,228,120	1,084,003	1,104,011	1,362,734	1,209,210

Divisions (*continued*).	1893–94.	1894–95.	1895–96.	1896–97.	1897–98.	1898–99.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Meerut	262,854	262,372	262,663	264,829	264,031	283,070
Agra Division	52,877	51,633	87,755	52,939	38,277	48,515
Rohilkhand	333,136	276,563	345,299	303,317	310,835	305,818
Allahabad	29,425	30,196	42,827	29,213	23,265	23,773
Benares	164,550	150,975	154,195	131,931	126,348	138,923
Gorakhpur	212,773	201,161	202,052	182,505	169,100	193,339
Kumaun	5,782	5,205	4,297	2,835	3,991	3,251
TOTAL, N.-W. PROVINCES	1,061,397	978,105	1,099,088	967,569	935,847	996,789
Lucknow	131,493	125,478	149,060	117,887	93,002	99,877
Fyzabad	129,380	130,261	140,741	128,573	119,250	131,215
TOTAL, OUDH	260,873	255,739	289,801	246,460	212,252	231,092
TOTAL, N.-W. P. AND OUDH	1,322,270	1,233,844	1,388,889	1,214,029	1,148,099	1,227,881

APPENDIX II.—*Statement showing Exports from, and Imports into, the North-Western Provinces and Oudh of Sugar, in maunds,* (1) *Refined and* (2) *Unrefined during* 1886–87 *to* 1897–98.

Articles and whence Imported or to where Exported.	Exports from the North-Western Provinces and Oudh.											
	1886–87.	1887–88.	1888–89.	1889–90.	1890–91.	1891–92.	1892–93.	1893–94.	1894–95.	1895–96.	1896–97.	1897–98.
(1) *Refined or Crystallised, including Sugar-candy.*	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
Madras Presidency (excluding chief seaport towns).	...	...	1	...	3	36	1	...	...	1	...	...
Bombay ditto ditto ...	7,546	7,320	3,787	6,099	10,373	12,622	19,737	15,866	16,086	18,761	9,284	8,353
Sindh ditto ditto ...	759	1,182	603	633	722	748	33	598	1,031	521	201	196
Bengal ditto ditto ...	8,047	7,919	7,868	7,643	7,207	20,896	10,604	11,610	17,154	17,288	31,780	31,745
Panjáb ditto ditto ...	156,011	129,976	137,121	217,143	269,165	270,965	207,021	299,302	248,449	288,203	318,293	278,121
Central Provinces ditto ditto ...	37,747	37,138	8,577	19,543	34,452	30,761	34,855	34,249	21,353	16,449	12,453	9,996
Berar ditto ditto ...	11,709	13,749	1,420	6,879	23,019	26,395	33,767	27,702	25,769	24,403	13,363	11,638
Assam ditto ditto ...	...	...	...	...	...	...	...	...	...	...	...	...
Rájputána and Central India	103,472	98,449	186,742	173,240	182,515	200,485	225,183	182,949	162,248	178,609	86,146	57,063
Nizam's territory	541	42	21	78	88	58	92	59	67	35	29	99
Mysore	20	9	2	7	20	...	...	...	...	...	...	...
Madras seaports	...	8	...	2	4	...	...	6	...	...	...	...
Bombay ditto	2,633	307	50	238	285	409	499	203	282	335	959	3,888
Karáchi ditto	...	3	8	3	...	31	7	20	10	48	40	39
Calcutta ditto	2,581	2,454	2,603	2,461	2,013	2,353	1,927	1,935	216	418	376	48
Total Refined	331,066	298,556	348,803	433,969	529,866	565,759	533,726	574,499	492,665	545,071	472,924	401,186
(2) *Unrefined*, viz., *Molasses and Jaggery or* Gur *and other Saccharine Produce.*												
Madras Presidency (excluding chief seaport towns).	...	...	...	...	...	4	...	1	...	...	...	...
Bombay ditto ditto ...	76,654	182,274	215,170	283,278	486,279	479,181	478,926	468,681	206,929	248,913	214,564	292,124
Sindh ditto ditto ...	104,394	199,440	201,725	138,122	205,614	210,573	204,481	264,897	238,894	187,636	154,553	198,049
Bengal ditto ditto ...	3,646	2,240	11,878	28,138	48,690	85,779	76,315	70,721	118,973	177,992	157,699	153,987
Panjáb ditto ditto ...	801,132	1,332,749	1,215,115	935,620	1,163,261	1,789,570	1,652,625	2,043,881	2,177,656	1,397,647	1,120,926	1,342,445
Central Provinces ditto ditto ...	152,093	175,966	313,128	274,099	333,766	292,341	282,447	346,296	307,896	342,172	277,885	313,027
Berar ditto ditto ...	10,030	49,522	70,261	95,657	87,418	73,345	77,485	63,072	26,927	43,715	42,935	75,768
Assam ditto ditto ...	...	...	...	...	...	...	...	...	...	...	173	...
Rájputána and Central India	1,332,434	1,490,061	1,309,181	1,431,088	1,492,318	1,374,176	1,683,860	1,708,028	1,712,669	1,730,790	1,591,797	1,621,506
Nizam's territory	234	68	43	45	177	47	82	69	85	49	78	31
Mysore	...	...	...	...	...	...	...	...	...	...	...	...
Madras seaports	...	952	...	...	...	...	...	...	...	...	...	...
Bombay ditto	776	2,498	2,468	3,399	1,027	1,368	1,903	1,115	701	625	1,194	1,825
Karáchi ditto	...	1,599	19	267	900	1,155	1,914	2,140	937	1,617	1,850	2,381
Calcutta ditto	2,599	1,934	7,294	47,783	22,921	15,136	21,782	13,535	59,230	37,769	20,470	14,580
Total, Unrefined	2,483,992	3,439,303	3,346,282	3,237,496	3,842,371	4,322,675	4,481,820	4,982,436	4,850,897	4,168,925	3,584,124	4,015,723
Total, Sugar	2,815,058	3,737,859	3,695,085	3,671,465	4,372,237	4,888,434	5,015,546	5,556,935	5,343,562	4,713,996	4,057,048	4,416,909

APPENDIX II.—*Statement showing exports from, and imports into, the North-Western Provinces and Oudh of sugar, in maunds,* (1) *refined and* (2) *unrefined during* 1886–87 *to* 1897–98—(continued).

Articles and whence imported or to where exported.	Imports into the North-Western Provinces and Oudh.											
	1886–87.	1887–88.	1888–89.	1889–90.	1890–91.	1891–92.	1892–93.	1893–94.	1894–95.	1895–96.	1896–97.	1897–98.
(1) *Refined or crystallized, including sugarcandy.*	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
Madras Presidency (excluding chief seaport towns).	...	...	...	7	...	...	...	...	...	...	...	...
Bombay ditto ditto ...	...	137	2	...	10	3	...	45	2	4	3	4
Sindh ditto ditto ...	...	43	...	...	...	...	...	...	...	...	...	...
Bengal ditto ditto ...	63,384	20,480	7,127	16,916	10,667	2,535	6,041	14,787	3,420	1,467	221	703
Punjáb ditto ditto ...	2,257	305	349	985	1,375	540	353	364	437	702	265	875
Central Provinces ditto ditto ...	16	...	49	31	55	36	51	73	24	...	55	5
Berar ditto ditto ...	...	...	...	...	...	...	...	...	...	...	...	...
Assam ditto ditto ...	...	...	...	...	...	...	...	...	...	...	...	...
Rájputána and Central India	544	24	112	336	234	306	151	755	1,920	270	72	147
Nizam's territory	...	...	...	...	...	...	...	...	...	...	...	...
Mysore	...	...	...	...	...	...	...	...	...	...	...	...
Madras seaports	...	...	...	3	...	...	...	...	...	...	...	...
Bombay ditto	20,179	8,870	5,538	6,031	26,080	20,557	3,059	30,253	20,596	33,233	37,997	183,523
Karáchi ditto	...	...	2	2	53	...	110	66	106	151	...	2,456
Calcutta ditto	10,600	25,885	27,223	23,262	103,856	64,552	33,981	47,065	32,956	55,068	25,992	47,333
Total, Refined	96,980	55,744	40,402	47,573	142,330	88,529	43,746	93,408	59,461	90,895	64,605	235,046
(2) *Unrefined*, viz., *molasses and jaggery or* gur *and other saccharine produce.*												
Madras Presidency (excluding chief seaport towns).	...	...	...	...	...	...	...	...	...	...	...	...
Bombay ditto ditto ...	1	25	7	7	...	1	5	3	...	37	187	14
Sindh ditto ditto ...	...	3	...	...	...	...	...	65	...	...	1,114	...
Bengal ditto ditto ...	239,145	141,524	125,416	173,806	144,741	169,064	186,453	247,850	103,281	160,417	123,661	160,406
Punjáb ditto ditto ...	39,044	7,915	26,628	39,364	67,656	18,382	29,715	12,726	51,600	70,196	114,588	177,324
Central Provinces ditto ditto ...	8	1,225	22	189	396	45	202	331	32	53	4,310	423
Berar ditto ditto ...	...	...	...	...	...	...	...	16	...	...	...	...
Assam ditto ditto ...	...	...	...	...	...	...	...	...	...	...	...	...
Rájputána and Central India	2,208	689	1,521	3,022	2,153	1,455	2,175	1,198	2,365	5,183	1,816	5,275
Nizam's territory	...	...	...	...	...	...	...	...	...	...	297	...
Mysore	...	...	...	...	...	...	...	...	...	...	...	...
Madras seaports	...	...	...	...	...	...	...	...	...	...	...	...
Bombay ditto	14	576	183	111	33	1,282	676	2,437	2,347	8,192	5,082	21,957
Karáchi ditto	...	...	...	...	47	21	...	...	...	...	...	11
Calcutta ditto	26,284	16,789	10,172	2,595	31,246	16,185	4,068	4,304	5,747	19,734	22,689	88,330
Total, Unrefined	306,704	168,746	163,949	219,094	246,272	206,435	223,294	268,930	165,372	263,812	273,744	453,740
TOTAL, SUGAR	403,684	224,490	204,351	266,667	388,602	294,964	267,040	362,338	224,833	354,707	338,349	688,786

APPENDIX II.—*Statement showing exports from, and imports into, the North-Western Provinces and Oudh of* **sugar, in maunds,** (1) ***refined and*** (2) ***unrefined*** *during* 1886-87 *to* 1897-98—(concluded).

Articles and whence imported or to where exported.	Net.											
	1886-87.	1887-88.	1888-89.	1889-90.	1890-91.	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.	1897-98.
(1) *Refined or crystallized, including sugarcandy.*	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
Madras Presidency (excluding chief seaport towns).	...	...	+ 1	— 7	+ 3	+ 36	+ 1	..	...	+ 1	..	...
Bombay ditto ditto ...	+ 7,546	+ 7,183	+ 3,785	+ 6,099	+ 10,363	+ 12,619	+ 19,737	+ 15,821	+ 16,084	+ 18,757	+ 9,281	+ 8,349
Sindh ditto ditto ...	+ 759	+ 1,139	+ 603	+ 633	+ 722	+ 748	+ 33	+ 598	+ 1,031	+ 521	+ 201	+ 196
Bengal ditto ditto ...	— 55,337	— 12,561	+ 741	— 9,273	— 3,460	+ 18,361	+ 4,563	— 3,177	+ 13,734	+ 15,821	+ 31,559	+ 31,042
Punjáb ditto ditto ...	+ 153,754	+ 129,671	+ 136,772	+ 216,158	+ 267,790	+ 270,425	+ 206,668	— 298,938	+ 248,012	+ 287,501	+ 318,028	+ 277,246
Central Provinces ditto ditto ...	+ 37,731	+ 37,138	+ 8,528	+ 19,512	+ 34,397	+ 30,725	+ 34,804	+ 34,176	+ 21,329	+ 16,449	+ 12,398	+ 9,991
Berar ditto ditto ...	+ 11,709	+ 13,749	+ 1,420	+ 6,879	+ 23,019	+ 26,395	+ 33,767	+ 27,702	+ 25,769	+ 24,403	+ 13,363	+ 11,638
Assam ditto ditto ...	...	...	...	...	...	...	...	...	...	...	...	...
Rájputána and Central India	+ 102,928	+ 98,425	+ 186,630	+ 172,904	+ 182,281	+ 200,179	+ 225,032	+ 182,194	+ 160,328	+ 178,339	+ 86,074	+ 56,916
Nizam's territory	+ 541	+ 42	+ 21	+ 78	+ 88	+ 58	+ 92	+ 59	+ 67	+ 35	+ 29	+ 99
Mysore	+ 20	+ 9	+ 2	+ 7	+ 20	...	...	...	...	...	...	...
Madras seaports	...	+ 8	...	— 1	+ 4	...	...	+ 6	...	...	...	...
Bombay ditto	— 17,546	— 8,563	— 5,488	— 5,793	— 25,795	— 20,148	— 2,560	— 30,050	— 20,314	— 32,398	— 37,038	— 179,635
Karáchi ditto	...	+ 3	+ 6	+ 1	— 53	+ 31	— 103	— 46	— 96	— 103	+ 40	— 2,417
Calcutta ditto	—8,019	— 23,431	— 24,620	— 20,801	— 101,843	— 62,199	— 32,054	— 45,130	— 32,740	— 54,650	— 25,616	— 47,285
Total, Refined	+ 234,086	+ 242 812	+ 308,401	+ 386,396	+ 387,536	+ 477,230	+ 489,980	+ 481,091	+ 433,204	+ 454,176	+ 408,319	+ 166,140
(2) *Unrefined*, viz., *molasses and jaggery or* gur *and other saccharine produce.*												
Madras Presidency (excluding chief seaport towns).	...	...	...	...	...	+ 4	...	+ 1	...	...	...	...
Bombay ditto ditto ...	+ 76,653	+ 182,249	+ 215,163	+ 283,271	+ 486,279	+ 479,184	+ 478,921	+ 468,678	+ 206,929	+ 248,876	+ 214,377	+ 292,110
Sindh ditto ditto ...	+ 104,394	+ 199,437	+ 201,725	+ 138,122	+ 205,614	+ 210,573	+ 204,481	+ 264,832	+ 238,894	+ 187,636	+ 153,439	+ 198,049
Bengal ditto ditto ...	— 235,499	— 139,284	— 113,533	— 145,668	— 96,051	— 83,285	— 110,138	— 177,129	+ 15,692	+ 17,575	+ 34,038	— 6,419
Punjáb ditto ditto ...	+ 762,088	+ 1,324,834	+ 1,188,487	+ 896,256	+ 1,095,605	+ 1,771,188	+ 1,622,910	+ 2,031,155	+ 2,126,056	+ 1,327,451	+ 1,006,338	+ 1,165,121
Central Provinces ditto ditto ...	+ 152,085	+ 174,741	+ 313,106	+ 273,910	+ 333,370	+ 292,296	+ 282,245	+ 345,965	+ 307,864	+ 342,119	+ 273,575	+ 312,604
Berar ditto ditto ...	+ 10,030	+ 49,522	+ 70,261	+ 95,657	+ 87,418	+ 73,345	+ 77,485	+ 63,056	+ 26,927	+ 43,715	+ 42,935	+ 75,768
Assam ditto ditto ...	...	...	...	...	...	...	...	...	...	...	+ 173	...
Rájputána and Central India	+ 1,330,226	+ 1,489,372	+ 1,307,660	+ 1,428,066	+ 1,490,165	+ 1,372,721	+ 1,681,685	+ 1,706,830	+ 1,710,304	+ 1,725,607	+ 1,589.987	+ 1,616,231
Nizam's territory	+ 234	+ 68	+ 43	+ 45	+ 177	+ 47	+ 82	+ 69	+ 85	+ 49	+ 219	+ 31
Mysore	...	...	...	...	...	...	...	...	...	...	...	...
Madras seaports	...	+ 952	...	...	...	...	...	...	...	...	...	...
Bombay ditto	+ 762	+ 1,922	+ 2,285	+ 3,288	+ 994	+ 86	+ 1,227	— 1,322	— 1,646	— 7,567	— 3,888	— 20,132
Karáchi ditto	...	+ 1,599	+ 19	+ 267	+ 853	+ 1,134	+ 1,914	+ 2,140	+ 937	+ 1,617	+ 1,850	+ 2,370
Calcutta ditto	— 23,685	— 14,855	— 2 878	+ 45,188	— 8,325	— 1,049	+ 17,714	+ 9,231	+ 53,483	+ 18,035	— 2,219	—73,750
Total, Unrefined	+ 2,177,288	+ 3,270,557	+ 3,182,333	+ 3,018,402	+ 3,596,099	+ 4,116,240	+ 4,258,526	+ 4,713,506	+ 4,685,525	+ 3,905,113	+ 3,310,380	+ 3,561,983
TOTAL, SUGAR	+ 2,411,374	+ 3,513,369	+ 3,490,734	+ 3,404,798	+ 3,983,635	+ 4,593,470	+ 4,748,506	+ 5,194,597	+ 5,118,729	+ 4,359,289	+ 3,718,699	+ 3,728,123

NOTE.— — indicates net imports. | + indicates net exports.

No. 27.

From the Government of India to the Secretary of State for India.

No. 16 (Legislative), dated 23rd March, 1899.

In conformity with the provisions of Section XXI. of the Indian Councils Act, 1861, I have the honour to forward herewith an authentic copy of the Law noted in the margin, which has been passed by the Council of the Governor General of India for making Laws and Regulations, and to which I have signified my assent.

Act No. XIV. of 1899 to further amend the Indian Tariff Act, 1894.

2. In accordance with the instructions contained in Your Lordship's predecessor's despatch No. 61, dated 21st December, 1869, a copy of the papers noted in the margin, relating to the Law, accompanies.

Statement of Objects and Reasons, dated 10th March, 1899.
Extracts from Proceedings, dated 10th and 20th March, 1899.

I have, &c.

(Signed) Curzon of Kedleston, &c., &c.

Enclosures in No. 27.

Enclosure No. 1.

Act No. XIV. of 1899.

Received the assent of the Governor General on the 20th March, 1899.

An Act to further amend the Indian Tariff Act, 1894.

Whereas it is expedient to further amend the Indian Tariff Act, 1894. It is hereby enacted as follows :— VIII. of 1894.

1. (*1*) This Act may be called the Indian Tariff Amendment Act, 1899 ; and

Short title and commencement.

(*2*) It shall come into force at once.

2. After section 8 of the Indian Tariff Act, 1894, the following section shall be added, namely :—

Addition of new section 8-A after section 8, Act VIII, 1894.

"8A. (*1*) Where any country, dependency or colony pays or bestows, directly or indirectly, any bounty or grant upon the exportation therefrom of any article and the article is chargeable with duty under the provisions of this Act, then, upon the importation of any such article into British India, whether the same is imported directly from the country of production or otherwise, and whether it is imported in the same condition as when exported from the country of production or has been changed in condition by manufacture or otherwise, the Governor General in Council may, by notification in the Gazette of India, impose an additional duty equal to the net amount of such bounty or grant, however the same be paid or bestowed.

Additional import duty on bounty-fed articles.

"(*2*) The net amount of any such bounty or grant as aforesaid shall be, from time to time, ascertained, determined and declared by the Governor General in Council, and the Governor General in Council may, by notification in the Gazette of India, make rules for the identification of such articles and for the assessment and collection of any additional duty imposed upon the importation thereof under sub-section (*1*)."

3. This Act shall not apply to any imported article the bill of lading for which was signed and given before the commencement of this Act.

Act not to apply in certain cases.

Enclosure No. 2.

STATEMENT OF OBJECTS AND REASONS.

During the last two years there has been a rapid and large increase in the amount of bounty-fed sugar imported into India, especially from Germany and Austria-Hungary. This appears to be seriously affecting the important sugar industries of India, as it is reported that many refineries have already ceased to work and that others are on the verge of being closed.

2. The present Bill has been prepared with the object of enabling the Government of India to impose countervailing duties on bounty-fed articles at the port of importation and thus to preserve the sugar cultivation and industries of this country.

(Signed) J. WESTLAND.

10th March, 1899.

Enclosure No. 3.

Extract from the Proceedings of the Council of the Governor General of India, assembled for the purpose of making Laws and Regulations under the provisions of the Indian Councils Acts, 1861 *and* 1892 (24 *&* 25 *Vict., Cap.* 67, *and* 55 *&* 56 *Vict., Cap.* 14).

The Council met at Government House, Calcutta, on Friday, the 10th March, 1899.

* * * * * * *

INDIAN TARIFF ACT (1894) AMENDMENT BILL.

The Honourable SIR JAMES WESTLAND moved for leave to introduce a Bill to further amend the Indian Tariff Act, 1894. He said :—" I see that it is stated in the List of Business that my object is stated in the title of the Bill. With all deference to the Honourable Member who has charge of the Legislative Department, I think it would require a large amount of perspicacity for anyone to see my object stated in the title of the Bill. As a matter of fact, I am proposing to open an entirely new chapter in our fiscal history, and which I have already endeavoured to make plain, in language which is not legal and not legislative, but which, I fancy, has been understood, by statements made in the newspapers.

" I propose to ask the leave of the Council to introduce a Bill which will have the effect of conferring upon the Government a power to impose countervailing duties in the case of bounty-fed sugar imported from European countries. I shall not take up the Council's time by explaining the economic effect of bounties and of countervailing duties. I take it for granted that Honourable Members know these matters as well as I do myself, and, if I refer to them for a short time, it is only with the object of introducing to the Council the facts with regard to which I shall have to satisfy them in asking leave to introduce this Bill.

" It is well known that the effect of bounties is two-fold. It affects in two entirely opposite directions the interests of the consumer and the producer. So far as regards the consumer, it brings the article of consumption to the market at a cheaper price than would otherwise be available to him. In that respect he receives benefit. But the producer looks at it from a different point of view. It supplants in the market the produce which he would otherwise bring to it by a competitive produce which has attached to it an artificial advantage. England, of course, is, as regards sugar, a nation of consumers. No project for the imposition of countervailing duties has there been made ; but India, on the other hand, is, to a very large extent, a nation of producers, and the productive interests of the country in respect of sugar are, as I hope to satisfy the Council, extremely important, and ought to be safeguarded by any measures that we can take. As regards the interests of the producer, I shall quote some official documents which have reference to them, and will show that sugar is a particularly important product in this country. Honourable Members will no doubt excuse my beginning my quotations

by a reference to an old Financial Statement—that of 1877-78. Sir John Strachey in talking of sugar in that statement says :—

> 'It is one of the most important agricultural staples of those provinces, and it is important not only to the agriculturists and manufacturers and consumers, but directly to the Government, which looks greatly to sugar cultivation for its irrigation revenue.'

"Then again, when the Chamber of Commerce, Calcutta, made a representation about a year ago on the subject of sugar, they also drew attention to the extreme importance of the productive interests connected therewith. They enclosed a memorandum from the firms interested in the sugar industry in Calcutta, in which it was said :—

> 'The importance of cane cultivation in the agricultural scheme of almost every Province in India is perhaps hardly appreciated, except by those officials whose duties have brought them into association with the settlement of land-revenue. The remark may be found in many a settlement report that in such and such tracts the entire rent, and therefore the entire revenue, is paid from the cane-field. "The peasants say," writes the Settlement-officer of Bareilly, "that sugar-cane is to other tillage as the elephant to other beasts." In almost every settlement report and district gazetteer of the Punjab, of the North-Western Provinces and of Oudh, the extremely important position held by sugar-cane in maintaining agricultural prosperity is prominently noticed, as the extracts quoted below sufficiently indicate :'

and then they proceed to make the extracts justifying the statement. Again, in a report from the Lieutenant-Governor of the North-Western Provinces received the other day, talking of the possibility of the reduction of cultivation of sugar in the North-West, he says :—

> 'The closing of refineries must lead to a contraction in the acreage under sugar. This reduction might, if the refining industry were destroyed, reach a maximum of 250,000 to 300,000 acres. Such a reduction in the acreage under a valuable and paying crop would cause far-reaching injury to landlords, tenants and the labouring population, and might affect the well-being of the rural classes to an extent that would produce serious discontent in the sugar-cane growing regions. The stability of the Government revenue would be affected, not indeed directly, because the land-revenue assessments are not ordinarily made on the special or crop rents that are in some places paid for land let out for a cane crop, but because the reduction of the profits of a valuable crop would impair the rent-paying capacity of the tenants, and thus cripple the resources of the landlords.'

"Perhaps these extracts will show the importance which is attached from the agricultural and economic point of view to the maintenance of sugar cultivation. With reference to the interests of the consumer, which I mentioned are entirely in the opposite direction, there is one very considerable discount to be reckoned in India, and that is, that the bounty-fed sugar is a refined sugar, and the sugar which is affected by it in this country is mostly the refined article. The common people of this country, that is the poorer classes, do not for the most part consume refined sugar, although they are taking to it lately in larger quantities. The principal staple, however, of their consumption is unrefined sugar, and so far as we can trace it at present, although the unrefined sugar has to a certain extent been affected by the large importation, to which I will presently allude, of bounty-fed sugar, still it is mostly in the direction of the cheapening of refined sugar that the effect of this bounty-fed import has been seen. Accordingly, although the consumer has benefited by the cheapness of the bounty-fed importations, yet the consumer who is so benefited is not the poorer classes but the classes who are comparatively well able to bear the burden of the removal of the cause cheapening their sugar. I find that the report made by the West Indian Commission expresses this view even with regard to England. They state :—

> 'It has, we believe, been argued that the reduction in the price of sugar which has resulted from the bounty system is such a source of gain to the British Empire as a whole that it would not be right for Your Majesty's Government to initiate any measures to bring about the abolition of that system. In that argument we do not concur. * * The benefit which the British Empire as a whole derives from any lowering of the price of sugar due to the operation of the bounty system is too dearly purchased by the injury which that system imposes on a limited class, namely, Your Majesty's West Indian and other subjects dependent on the sugar industry. * * We have, therefore, no hesitation in saying that the abolition of the bounty system is an object at which Your Majesty's Government should aim, if they should see their way to securing that result, and that the accomplishment of such an end is worth some sacrifice, provided always that such sacrifice would be really effective, and would not involve evils out of all proportion to those which it is desired to remove.'

"Of course we are not, so far as this Legislative Council is concerned, considering the interests of the West Indian subjects of Her Majesty ; but the very

expressions here used might be adapted to India with a small variation, and we might say that the benefit which India as a whole derives from any lowering of the price of sugar due to the operation of the bounty system is too dearly purchased by the injury which that system imposes on one class, namely, the agricultural population which is dependent on the sugar industry of the country.

"I wish to bring before the Council the actual facts of importations into this country so as to show to what an extent in recent years the importation of bounty-fed sugar has increased. I have before me the statistics of importation for the last twenty years stated in thousands of hundredweights. The facts are that for the first ten years the importation of sugar was about one million hundredweight; towards the end of that period it had risen to one million and a half hundredweight. By far the largest portion of this, almost the whole of it, was Mauritius sugar. European sugar hardly entered into the figures at all. In none of the first five years was there any European importation at all, and during the last five years there was an importation of 15,000, 10,000 and 11,000 hundredweight in three of the years concerned. After 1890, although the importation from Mauritius continued and rather increased, that is to say, moved up from about one million three hundred thousand to one million six or seven hundred, yet the importation from Austria and Germany vastly and suddenly increased. The year 1890-91 was almost the first year in which German sugar was imported, and in that one year 709,000 hundredweight were imported. The figures then fell off for a short time, but during the last three years, 1896-97-98, the amount which has been imported from Austria and Germany combined has been 874,000 hundredweight; then the year after that more than two million hundredweight, and in the ten months of this year more than a million hundredweight has been received. This is a very large and a very sudden increase, and I will mention the facts to which it is due. In 1897 the Government of the United States passed an act, upon which the Bill now before the Council is framed, by which they imposed countervailing duties upon sugar. The effect of that Act was to cut out the bounty-fed sugar of Europe from the markets of the United States. The consequence was that that bounty-fed sugar was driven to find its market in India, and it found its market very suddenly and very abundantly. Hon'ble Members are no doubt aware that a couple of years ago the attention of Her Majesty's Government was drawn to the critical condition of the sugar industry in the West India Islands. They sent out to inquire into the subject a Commission of which two members were my own distinguished predecessor Sir David Barbour, and the Hon'ble Sir Edwin Collen's distinguished predecessor Sir Henry Norman. They made a report in which they showed that the sugar industry of the West India Islands, upon which the commercial prosperity and even the administrative possibilities of the West Indian Colonies depended, was in an extremely critical state, and they attributed it all to the existence of the bounty system. Thereupon Her Majesty's Government took what they considered the only means of having the bounty system revised, namely, they proposed to call a Conference of the various European Powers in order to consider the whole question of bounties. At that time the Government of Belgium had had its attention drawn to the subject, and they met the invitation to a Conference issued by Her Majesty's Government by stating that they had already taken measures to have a Conference of the Powers. This Conference took place in Brussels in the summer of 1898. It was a Conference which came to no practical conclusion. The proposals regarding the dropping of the bounty system were opposed for various reasons, mainly by France and Russia, but no practical conclusion was come to. The Conference separated on the understanding that the Government of the King of the Belgians would continue by diplomatic action to pursue its object. At the instance of the Calcutta Chamber of Commerce we had taken measures to have India represented by a member at that Conference, and Mr. Ozanne, who was a recently retired Civil Servant of the Presidency of Bombay, was the Indian representative. After the Conference separated we received a letter from the Chamber of Commerce of Madras, and also from the Chamber of Commerce of Upper India, in which they recommended that now, as the proposals of the Brussels Conference proved ineffective, we should at once take measures to impose a countervailing duty.

Madras is to some extent an exporting Province, and it grows a fair quantity of sugar; but Cawnpore, the seat of the Chamber of Upper India, is the centre of a most important sugar industry and is much more in touch with the subject and much more closely affected by it than any of the other Chambers. The Chamber of Commerce of Calcutta has also taken up the subject, and I find from their last annual report that they recommend the imposition of countervailing duties as the only alternative in the event of further negotiations regarding the abolition of bounties proving futile, and that a continuance of unrestricted importation will probably result in the closing of the remaining sugar refineries in the district of Jessore, a large number of which have already ceased to work.

"But I am a little in advance of the subject when I refer to the closing of the sugar refineries. I wish to show that it is not merely a matter of theory, but an ascertained fact that the sugar industry of this country has been very adversely affected.

"In India altogether about 3,000,000 acres are under sugar-cane cultivation. Of this 1,300,000 are in the North-Western Provinces and Oudh, 1,000,000 are in Bengal, and the remaining 700,000 are scattered over the other provinces of India. It is obvious, therefore, that by far the most important Province from the sugar-producing point of view is that of the North-Western Provinces and Oudh. Now, we have obtained very full particulars of the recent condition of the sugar cultivation and of the sugar-refining industry in the North-Western Provinces, and I may at once say that the immediate effect upon cultivation has not been very great. Apparently the production has diminished, taking the whole of India, from about 3,000,000 to about 2,600,000, that is to say, a drop of about 13 per cent.; but there are many reasons why cultivation should not be immediately affected. In the first place, the natives of this country are extremely conservative in their habits and customs. It is very difficult to move them from the existing cultivation, and they will for a long time sustain loss in that cultivation before absolutely giving it up. Moreover, agriculture is largely carried on under advances for delivery of actual produce, and these obligations are obviously obligations which can only be carried out by continuing cultivation, so that the mere depression in the price of sugar does not make itself immediately seen in the reduction of cultivation. It will do so ultimately beyond a doubt. As regards refineries however, we have strong evidence that the importation of bounty-fed sugar is causing very serious disaster. In a letter from His Honour the Lieutenant-Governor of the North-Western Provinces he tells us:—

> 'There has been a substantial decrease in the acreage under cane in those parts of the Province where the margin of profit on the cultivation is least, this decrease being probably due to the competition of bounty-fed sugar. Further experience is, however, required to arrive at certain conclusions in this respect.
>
> 'Foreign sugar does not as yet compete with *gur*, but it is now competing with refined sugar for home consumption, of which article it has seriously reduced the exports. It has also already caused the closure of numerous refineries, while it has seriously endangered the stability of others. The Director gives statistics showing that 120 refineries have stopped working, but his figures on this point are incomplete. He has since informed the Lieutenant-Governor that no less than sixty have been closed in a part of the district of Azimgarh alone, of which no account is taken in his memorandum.
>
> 'The price of refined sugar has been reduced about 12 per cent. in five years, and this decline has had a general lowering effect on all sugar prices.'

"He goes on to report also that—

> 'The information available points to the probability of the further cheapening of the production of bounty-fed sugar in the future, to its importation in increasing quantities, and to the further under-selling of the native refiners.
>
> 'It is of much more importance to these Provinces to preserve their sugar industry on the basis of present arrangements than to have a cheap foreign sugar supplied to the consumers of the refined article.
>
> 'There is no prospect of native processes being so improved that refineries could hold their own against the foreign competition assisted by bounties.'

"I may mention that in the description of the condition of things in the North-Western Provinces we are not dependent upon the reports of the North-Western Provinces alone. For example, in reply to our enquiries, which we

issued last September, we have a report from the Resident of Hyderabad regarding the sugar consumption in Berar. He says :—

> 'In 1893-94 the imports of refined sugar from the North-West Provinces were 27,702 maunds; in each subsequent year there has been a steady decline till in 1897-98 the quantity imported amounted to only 11,638 maunds, or considerably less than half the former quantity. A more than corresponding rise is to be observed in the imports of refined sugar from Bombay port; commencing at 50,158 maunds in 1893-94, the figure has now risen to 127,625 maunds, or more than 2½ times the former import.'

"So that, whether this sugar which had been imported in Bombay and Berar is bounty-fed or not, it is obvious that the conditions of the trade are at present such that a Province, which had formerly a large supply from the North-Western Provinces, has ceased to derive its sugar from there. The same is the case as regards the Punjab. The Government of the Punjab have not as yet sent us their report, but they have sent us in anticipation of the report a telegram which I shall read. They say :—

> 'Imported sugar almost entirely superseding Indian refined sugar in towns. Consequently great falling off in imports of refined sugar from North-Western Provinces, previously the chief source of supply. Native sugar refineries are also gradually being closed. In the Punjab, cultivation, though not extending, has not fallen off, as the demand of the agricultural population, which is chiefly for unrefined sugar, is still sufficient to maintain prices at a level which renders cultivation profitable.'

"It will be seen, therefore, that the information which we have received as to the condition of the North-Western Provinces in respect of their sugar industry, whether we look at what has been said by the Government of the North-Western Provinces itself, or by the effect as observed from the outside by the Government of the Punjab and the Resident of Hyderabad who represents the Berars, is the same, namely, that the prospects of the industry in the North-Western Provinces are very much like the prospects which have been described by the Commissioners who were sent to investigate the matter in the West India Islands. As regards Calcutta it may be sufficient for me to refer to the statement of the Chamber of Commerce in their last annual report—a statement which I have already quoted—

> 'In any case a continuance of the unrestricted importation of bounty-fed sugar would probably result in the closing of the remaining sugar refineries in the district of Jessore, a large number of which had already ceased to work.'

"I have some further information which I might lay before the Council regarding the falling off in the price of sugar which, of course, is the direct effect of the importation of the bounty-fed sugar and through which those deleterious effects I have been describing have been operating. The general falling off in prices during the last three years has been (at Cawnpore) a falling off of about one and a half rupees out of a price of about 11, 12 and 13 rupees per maund—a sufficiently serious falling off to necessitate the closing of the refineries, and, when the refineries are closed, there must, no doubt, follow a falling off in the cultivation. I think therefore the Council may take it as proved that we are in the presence of a real danger to an important industry; and I trust they are sufficiently convinced that the time has come when, if we are to protect our sugar industry in this country, which is extremely important, it is necessary for us to take measures against bounty-fed importations. Of course we might wait a little longer; we might wait till our refineries are still further closed, and till the raiyats are so impoverished as to give up cultivation altogether; but it is better in these matters, I think, to take protective measures beforehand, because it is far more easy to revive and encourage an existing industry than to restore one which has been by adverse circumstances extinguished.

"It is hardly necessary for me to touch upon the extent of bounties, or on their effect upon the trade of foreign countries. We are legislating only as regards India. But I would like to point out that the measure we are taking, or which I am asking the Council to take, is not necessarily a measure that condemns the action of foreign countries in putting bounties upon their sugar. We have only regard to our own internal concerns, and it may be perfectly possible for us even to approve the action of foreign Governments in putting a bounty upon their sugar and at the same time to take measures to prevent their having an injurious effect upon our own cultivation. I observe that the argument which the representative of France laid before the Brussels

Conference as justifying the granting of sugar bounties in France was this. He said it is all very well for England to denounce sugar bounties. England is the mistress of the seas ; she can look forward with confidence even to a state of isolation arising out of war ; foreign ports will still be open to her and her ports will be open to importation from foreign countries ; but in the case of France it is exactly the opposite. If France is isolated and an enemy of France has command of the seas, then the result might be a very serious national disaster. It is the duty of the Government of France, as a mere question of national preservation, to take care that France shall be independent of foreign countries in the matter of her provisionment. If a certain quantity of sugar is absolutely necessary for the inhabitants of France, then the Government of France must take care that that amount of sugar shall be forthcoming within an area that is under her own command, and, if the cultivation under normal circumstances is not sufficient to produce it, it is legitimate for the Government, by the operation of bounties, to give sufficient encouragement to the internal cultivation of sugar. It is therefore a matter of internal administration. What I point out with regard to this is that we may quite agree with them. We are not bound in any way to denounce the system of bounties as a matter of internal administration of any foreign country. We only wish to protect our own industry, and we claim the same right to preserve our industry in this country as foreign nations no doubt claim to preserve and encourage the sugar industry and sugar cultivation in their own territories."

The motion was put and agreed to.

The Honourable SIR JAMES WESTLAND introduced the Bill.

The Honourable SIR JAMES WESTLAND moved that the Bill and Statement of Objects and Reasons be published in the Gazette of India and in the local official Gazettes in English. He said :—" The Bill, I may state, is in form a sufficiently simple one. It is copied in its wording from the Bill which is actually operative in the United States of America. We take power to impose, in addition to the ordinary tariff which is levied under the Tariff Act, a further duty equal to the amount of bounty which is granted by any foreign nation. The wording of the Act is in short the same as the wording of section 5 of the United States Act of the 24th July 1897. In the United States they have a slightly different form of legislation from ours ; that is to say, the Act itself imposes the duty, but lays down directions that the Executive shall prescribe rules for its assessment and regulations for the carrying out of the purposes of the Act. In this case we have slightly modified the procedure, and we give the Government power to impose the necessary duties as well as to lay down these rules and regulations. I hope that the Act will be considered sufficiently simple to pass without being referred to a Select Committee, and it is the intention of the Government to pass it if possible without its being examined by a Select Committee during the currency of the present session."

The Honourable MR. ALLAN ARTHUR said :—" I should like to say that I support this Bill. As the Honourable Sir James Westland has said, the Bengal Chamber of Commerce urged that legislation in this direction might be undertaken. It might be urged that if foreign Governments are generous enough to give us sugar under cost price it would be rather foolish of us not to take the sugar on those low terms and grow something else on our sugar land. I think, as the Honourable Sir James Westland has pointed out, the interests of the producer in India are greater than the interests of the consumer, and as the unrestricted importation of beet sugar is likely to kill the sugar industry in India altogether, I think that legislation will be of great benefit to a great many people in India. With reference to the Honourable Sir James Westland's remarks with regard to the passing of the Bill this session, I should like to call his attention to one point, namely, that in putting the Bill into operation there may be cases of great individual hardship. I understood him to say that the probability was that the duty which would be imposed would be equivalent to the bounty that the foreign Governments give. I think it is highly improbable that the price of sugar will rise in India to the extent of the duty that will be imposed. I may say that there has been a very large quantity of beet sugar sold ' to arrive,' as it is called, in Calcutta, that is, shipment for months ahead, and if the price of sugar

does not rise to the same extent as the amount of the duty, then I think the buyers of that sugar will probably be very heavy losers by this legislation, unless provision is made to avoid this ; and I hope the Honourable Sir James Westland, in making arrangements to bring the Bill into operation, will consult the mercantile community in the matter."

The Honourable SIR JAMES WESTLAND said : " The Honourable Mr. Arthur was good enough to mention this matter to me before the commencement of the proceedings in Council. There is a provision in the Tariff Act as it stands which alters the terms of contracts in which the conditions as regards the payment of customs duty have been altered by new legislation. I do not know if that would go far enough in giving relief in the cases to which the Honourable Mr. Arthur refers ; but in legislation like that which I have just been announcing it is always difficult to enter into the matters of detail to which the Honourable Mr. Arthur has referred before taking up the general question, because it is necessary to keep our intentions secret pending preliminary consideration, and it is impossible therefore to consult people in regard to details. However, I hope to be able to settle this matter in consultation with the Honourable Mr. Arthur, and possibly in consultation with the sugar merchants who represent the industry in Calcutta."

The Honourable RAI BAHADUR P. ANANDA CHARLU said :—" I very gladly welcome this Bill. I consider it to mark a very important epoch by way of a departure in the fiscal legislation of this country. The reasons for my considering so I shall reserve for a future occasion, as the Honourable Financial Member has stated that very probably this measure will be brought up for discussion and determination during this session. I will at present only make this observation that even from the point of view of the consumer it is quite easy to show that this measure will be a welcome one."

The motion was put and agreed to.

Enclosure No. 4.

Extract from the Proceedings of the Council of the Governor General of India, assembled for the purpose of making Laws and Regulations under the provisions of the Indian Councils Acts, 1861 *and* 1892 (24 *&* 25 *Vict., cap.* 67, *and* 55 *&* 56 *Vict. cap.* 14).

The Council met at Government House, Calcutta, on Friday, the 20th March, 1899.

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INDIAN TARIFF ACT (1894) AMENDMENT BILL.

The Honourable SIR JAMES WESTLAND moved that the Bill to further amend the Indian Tariff Act, 1894, be taken into consideration. He said :—When I moved on last Council day for leave to introduce this Bill, I was careful to explain it solely with reference to Indian conditions. There is one part of the subject to which I did not then refer, but to which I shall now take the opportunity of referring. His Excellency the Viceroy has received a memorial from the sugar-planters of Mauritius. These sugar-planters are very naturally dismayed at the prospect of their being reduced by the operation of the bounties given in the countries of Europe to the conditions in which the sugar-industry is in the West India Islands. It is with reference to that that they make an appeal to the Viceroy to have legislation passed in this country of the character which is now before the Council. I think that the days are passed when under the pretence of absolutely free trade no consideration was given to any circumstances arising outside the country concerned. We now do admit a certain obligation to other countries, and especially to those with whom we are knit by the Imperial tie. We are especially interested in the sugar-cultivation of the Mauritius by reason of the fact that that sugar-cultivation is carried on very largely by labour imported from India. The greater part, I believe, of the inhabitants of the Mauritius are Indians, and as such are

entitled to some measure of protection from this Council. The petition of the sugar-planters and merchants commences as follows :—

> 'The cultivation of sugarcane and the manufacture and sale of cane sugar are practically the sole industries of the inhabitants of Mauritius, and their welfare and even their livelihood depend upon the remunerative sale of the sugar produced.
>
> 'The sugar industry directly or indirectly gives employment and the means of subsistence to a population of about 380,000, of whom more than 260,000 are Indian immigrants or immediate descendants of natives of India.
>
> 'These Indian immigrants have come to Mauritius with the sanction and under the control and protection of the Imperial and the Indian Governments secured by laws suggested, approved or imposed by both Governments, and therefore the Imperial and Indian Governments are jointly responsible with the Government of Mauritius for the welfare and means of subsistence of themselves and their descendants.'

" That perhaps carries things too far. However, as I pointed out, the sugar-cultivation in Mauritius is one which gives employment to a very large Indian population, and if our legislation, based as it is on interests which are purely Indian, and refer to this country alone, also helps to preserve the means of subsistence to such a large number of Indian immigrants, I think I may bring it before the Council as one additional reason in support of the Bill which was introduced last Council day. I am glad to think from the public notices which I have seen of the legislation now before the Council I am not called upon to defend it. It has been generally approved of, and I think my proper course is to wait in case objections are made to it before I say anything further in its defence."

The Honourable MR. MEHTA said :—" I confess I should have preferred that this Bill had been allowed to run the usual course which Bills in this Council run. I should have preferred if the Bill had been referred to a Select Committee. I say this for two reasons. In the first place, it seems to me that the matter is not quite so simple as my honourable friend Sir James Westland said in introducing the Bill. He has placed certain materials before the Council, but it seems to me that a certain amount of further investigation and verification is absolutely essential before the conclusions drawn by him can be accepted. It is true that a certain number of sugar-refineries in the country have been stopped, but I am not quite sure that the facts placed before us necessarily point to the importation of bounty-fed sugar as the sole or main cause of that result. It seems to me that further enquiry and investigation and verification of some of those figures and statistics should be really made before we commit ourselves to the legislation which is sought for. The second reason I have is that the matter is not so urgent as not to allow time for the appointment of a Select Committee. I quite admit, as the Honourable Sir James Westland has pointed out, that we must not wait until the sugar-industry in this country is destroyed, but I do not think he has made out a case for such urgency as to justify the course he has adopted in not referring the matter for consideration to a Select Committee. For these reasons it seems to me that it would have been more desirable if the Bill had been referred to a Select Committee."

The Honourable MR. GANGADHAR RAO MADHAV CHITNAVIS said :—" My Lord, I wish only to make one remark, and that is to express my cordial concurrence in the proposal which has been submitted to the Government by the Honourable the Finance Member. The existing state of things with regard to the sugar-industry of India is such that it is impossible to tolerate it any longer. The bounty-fed beet-sugar has nearly driven away cane-sugar from our markets, and one by one the raiyats are giving up cane-cultivation. And once a raiyat has given up cane-cultivation, he has practically done with it for ever. For it should be borne in mind that the raiyat plants canes and preserves their cuttings immersed in water for the next year's cultivation. A raiyat who has failed to preserve these cuttings has either to purchase them—if at all procurable—at an enormous cost or to give up cane-cultivation altogether. Thus, should the existing state of things be allowed to continue, a time might come when the cultivation of cane will disappear altogether from this country.

" In the same manner the date-sugar having been driven away from the market by the bounty-fed beet, it is said that the raiyats in Bengal have ceased to grow date-trees. And, that being the case, it is apprehended that the manufacture of sugar from date-juice might disappear from Bengal in the course of a few years.

"When the indigenous manufacture of date and cane sugar has been thus destroyed in India, the European Governments will, of course, discontinue the bounty which they now give to the beet-sugar. What is more, the European manufacturers themselves will then be in a position to sell their inferior sugar at their own price. When things have been brought to this pass, it is likely that the Indians will make an effort to revive the cultivation of date and cane. But the European Governments referred to above might then resume the practice of giving bounty to the beet-sugar and thus once again destroy the sugar-industry of India. It will thus be seen that the only way of saving this purely agricultural country from a serious disaster is to levy a countervailing duty on all bounty-fed sugar.

"Of course it would be absurd to expect unanimity of opinion on such a measure as the Sugar Bill. There are people, well-meaning people too, who I know view it with alarm as being repugnant to the principles of free trade. But free trade can never prevent us from initiating legitimate measures of self-defence. In my humble judgment it is the first duty of the Government of India to consider the interests of the people of India ; and it is from that point of view that I look at this question ; and, looking at it from that point of view, I can have no doubt that the course which the Government of India have determined to take is a just and right one, for the initiation of which the people will feel most grateful to Your Lordship."

The Honourable RAI BAHADUR P. ANANDA CHARLU said :—"At the first blush, it may look as though we are flying in the face of free trade principles. But, in reality, we are doing nothing of the kind. If our action were abnormal, it is only directed against steps which are themselves abnormal and which, while inflicting deeper and deeper injury on us, seem to admit of no other cure, in order to safeguard what is of vital interest to us. But, in truth, are we embarking on anything abnormal ? In my humble judgment, we do no such thing.

"If the sugar whose importation is proposed to be subjected to countervailing duties were the outcome of natural resources and of normal conditions, it may perhaps be arguable whether, on commercial grounds, an exception could be taken to it on the ground of irreparable loss to us. It may be equally arguable whether, on commercial grounds, it is expedient to stem, by artificial means, a torrent which —as unerringly as does water—must find its proper level sooner or later. But the sugar in question is unnaturally produced. It is made capable of being sold as cheap as it is now, only by reason of bounty which bolsters it up—be that bounty in the shape of a prior advance by the States to stimulate manufacture or be it in the shape of remission or refund of taxation after the commodity has been produced, in order to quicken its circulation in the Indian and other unprotected markets, for the up-keep or welfare of which the bounty-giving Governments make no sacrifice or have no concern. Noting the tendency it has created to alarmingly diminish the cane-cultivation in extensive tracts, solely and wholly devoted to it in this country, and the dreaded certainty of danger that our sugar manufactories will have soon to shut shop and pass out of their present prosperous existence, the day is not distant when locally-made sugar is sure to be a thing of the past or be relegated to the limbo of our other and numerous extinct industries. When that bitter cup is full to the brim, the imported sugar will increase by leaps and bounds, rule our markets absolutely without a rival, and its owners may dictate their own terms or drive the hardest bargains. Let us suppose—and the supposition is by no means unnatural—that the bounties which now prop up the manufacture in the foreign countries are withdrawn—be it from caprice or because no longer necessary or because wiser counsels prevail. The result will be that a well-established and thriving industry would have been, in the meantime, brought (at best) to the brink of ruin. The capital and labour, which are now working with excellent results, would be diverted from the production of commodities of extensive local consumption and sent adrift in problematic search of tentative re-investments in a spirit of timid experiment or hazardous enterprise, so foreign to the genius, nature, and habits of the people of this country. It is easy to realise what will be the fate of even the present consumer when reduced to a condition of sole or virtual dependence on the tender mercies of that foreign producer. Viewed in this light alone, the present Bill is fraught with good to the consumer as well as the producer in this country. This is not all. I think that, unless, indeed, we rigidly define the term 'consumer' as an intensely and sordidly selfish being, the word has a wider

significance in this country where spontaneous charity is enjoined on every individual as an inviolable and meritorious religious duty towards the poor and helpless within the fold, common to them and him. If, then, the consumer should regard himself, not merely as living for himself and his immediate kith and kin, but as one acting for and acted upon by the common good of his community, as distinguished from other communities, he could not help taking a far more comprehensive view of his position. He would then conceive his well-being as part and parcel of the well-being of the rest of his community and welcome some amount of hardship and sacrifice on his part without murmur. If, again, the present consumers are of the well-to-do classes as asserted, our position is all the more strong ; for we must bear in mind that they must then realise a near and repeatedly-recurring future when they must come in, for their share of contribution, either in the shape of additional taxes or of large charities, in case the hosts of cane-growers and sugar-makers of the day are thrown out of employ or reduced to a state of starvation—as is but too likely in this land of periodic famines—and are thereby cast on their hands or on the State, which is the same thing. Having regard to their inherited nature or to this eventuality, which—be it repeated—is by no means improbable, the effect of this Bill, even if it should cause a rise in the price of sugar they use, would be to lay men of comparative competence under a species of indirect taxation for the benefit of their poor brethren, which they will not and ought not to grudge. These are among my reasons for advocating this measure with perfect loyalty to free trade doctrines.

" There is another ground—not an altogether inapt ground—in favour of this Bill. It is this, namely, that it is calculated to dispel the notion—more or less widespread and more or less groundless—that free trade has ruined the indigenous industries—a notion which cannot but lend an undesirable colour to the opinion entertained about the effects of the British rule. I regard it, therefore, not only as inaugurating an era in the fiscal legislation of the country and as being welcome on that account and on its own merits, but also as dispelling the above erroneous notion. There is no doubt, that with the advent of British sovereignty, the reign of free trade has synchronised in this country ; and, with that reign, a taste has set in for British articles of clothing which began to flow in unchecked. But the truth ought not to be disguised that such is, after all, the fault of the altered tastes rather than of free trade. Certain new ideas of the decencies and comforts of life, which have followed in the wake of the civilization of the West, have weaned not a few from their old and traditional ways ; but free trade, as such, has had nothing to do with that result. Exigencies that have arisen in consequence may have, as I think they did, intensified the result, but it is difficult to see how that result could be helped or could be said to have been originated by it. For every one, man or woman, who fell in with and adopted the Western fashions, there are tens, if not hundreds, who have adhered to their old ways, in a perceptible degree. It is therefore illogical to say that because a large number of the well-to-do and the seekers of the fashion of the day have utilised the Western articles, the articles themselves or the natural facilities for their influx should be denounced or proscribed. Giving free trade the fullest swing, it seems to me that the local industries might well have thriven if the tastes of the people had, in the bulk, remained unvaried and unvariable. Take, for instance, the almost entire masses of the Hindu ladies. They have been untouched by the fashions of their Western sisters, and the species of manufacture which supplied their clothing have, I believed, continued to hold the ground. As surely would the manufacturer of male clothing have continued its hold, if men too could be brought to display or develop a like tenacity to old habits. While for these reasons I regard the prevailing outcry against free trade as unreasonable, while I recognise in the Bill before us a departure which marks a desirable epoch in our fiscal legislation, and which will prove a powerful solvent of doubts entertained about the operation of free trade doctrines, I cannot but share the feeling nor get rid of the impression that, just as the threatened ruin of the cane-growers and sugar-makers has laudably moved our Government towards this measure of preventive legislation, the urgent need exists to inaugurate measures, on similar lines, to meet the case of the millions of skilled workmen whose ruin is almost accomplished and whose instructed and inherited aptitude for delicate workmanship, menaced with extinction at every famine that comes round, presents a no less anxious and grave problem of the day.

"Claims of international commerce may be said to be in the way. I am not unaware of the motives, results and advantages laid to its credit. I nevertheless venture to think that it suffices to say just at present that the subject has not yet ceased to be controversial and that, so far as this dependency of the British Sovereign is concerned, those motives, results and advantages are either too remote or too problematic to be efficacious. In the meantime let me allow that the claims of international commerce are indeed great. But the claims of a nation's prosperity and its freedom from utter impoverishment are even greater. The question may well be asked, whether the sustenance and prosperity of millions of lives, which run imminent risk of being either altogether lost or sensibly enfeebled, are not to be a primary object of every Government—a consideration paramount above commerce, international amity, and all else. One may well entertain the grave doubt whether there is not, to the problem to be grappled with, a *political* as well as a *commercial* and an economical side, whether the European and the American Governments, which are not wanting in intelligence and which have persisted in non-free-trade principles in dealing with other States, side by side with a full recognition of free-trade principles within their own territorial jurisdictions, do not, after all, act in tacit acknowledgment of some such distinction, and whether sufficiently long periods of such persistence have not elapsed to refute, by practical, concrete results the abstract theory that the policy is bound to prove suicidal.

"But these latter remarks are superfluous to set on its legs the Bill before us—a Bill which has indisputable merits of its own. The sole aim with which I have thrown out those observations is to hint at what seems to me a possible solution of a kindred problem of no less gravity; and I have done so, in the hope that what is but an academical debate to-day in relation to the Bill now on the anvil, will, before long, pass within the domain of practical politics, and that this Bill will prove but the harbinger of other measures to come, though they must needs be experimental, fragmentary, and cautious at the outset."

The Honourable SIR JAMES WESTLAND said:—"In the remarks of the Honourable Mr. Mehta I think he has failed to observe the distinction between the functions of this Council and the functions of a Select Committee. The question whether this Bill is in principle required or not, and whether we ought to provide for the protection of the sugar-industry against existing adverse influences is, it seems to me, a question which the Council must decide for itself, and not a question which it should refer to a Select Committee. The business of a Select Committee rather comes in after the principle has been laid down and after the general tendency of the proposed legislation has been accepted, to see whether the proposed Bill is correct in point of form, or whether it cannot be altered and improved in respect of the subsidiary arrangements connected with it. The reason why no proposal has been made to refer this Bill to a Select Committee is that if the principle is adopted there is really very little work for the Select Committee to do. The Bill, as I said last Council day, has been framed on the basis and upon the wording of an Act which is actually operative for purposes to which we desire to apply this Bill. It has been carefully framed upon the experience of another legislature, and I think we may take it for granted that a further consideration of it by a Select Committee would not have altered it in point of form, or suggested any improvements in a matter so simple as that of giving powers to Government to impose duties of a certain class. Then, as regards the statement of the Honourable Mr. Mehta that he did not consider that the Bill was of a sufficiently urgent character to be brought up to be passed at this Council, I think I may reasonably refer him to the two speeches which have been delivered, one by the Honourable Mr. Chitnavis, himself an agriculturist and in close touch with all agricultural questions, and the other by the Honourable Mr. Charlu, who is a keen observer and reporter on all matters relating to social economy in India. I think the statements of those two gentlemen will have convinced the Council that after all there was some reason for regarding this measure as an urgent one and seeking to pass it before the session comes to an end. Nor do I think that it is altogether reasonable to refer to a Select Committee the question of whether the statistics which have been laid before the Council are correct. I have not stated these matters of my own knowledge. What I stated to the Council was taken from the official reports of the high officers who were

instructed to enquire into the subject, which reports have been based upon very careful enquiries. These papers I quoted pretty fully last Council day, and I can only say that if any Honourable Member had desired to verify them still further, the fuller reports and details could easily have been placed at his disposal. I trust, therefore, that the Council will feel that the measure which is before them has been amply justified and will, on the motion which I shall presently make, be pleased to pass it into an Act."

The motion was put and agreed to.

The Honourable SIR JAMES WESTLAND moved that to the Bill the following clause be added, namely:—

"3. This Act shall not apply to any imported article the bill of lading for which was signed and given before the commencement of this Act."

Act not to apply in certain cases.

He said:—"I am afraid that the Honourable Mr. Mehta may now pounce upon me and say that my moving this amendment is evidence that the matter ought to have been laid before a Select Committee; but this really is no new matter. It is not brought before the Council for the first time. The Honourable Mr. Allan Arthur mentioned it at the last meeting, and I gave an undertaking that I should consider the subject with Mr. Allan Arthur and with his constituents, and be able to lay it before the Council for consideration when the Bill came up to be passed. In an ordinary measure for changing the duties imposed by the Tariff the law prescribes that the contracts which have been made before the change have to be modified with reference to that change. The principle upon which that provision in the law is based is that under ordinary circumstances the change of a tariff duty results in the change of the price of the article concerned more or less exactly by the amount of the duty imposed or taken off. If this were merely a revenue measure, if it were a measure merely for altering the rate of duty which is demanded at the ports upon sugar, I would be strongly averse to making any alteration in the existing provision of the law relating to current contracts for purchase or sale of articles to be imported. I take it for granted that people who make contracts of the kind know what the law is relating to them, and relating to the operation upon them, of any subsequent alteration of duty. But the present measure is not one that has simply for its object the alteration of a duty. It is one that will have some effect upon the sugar trade as a whole. No doubt the price will enhance. It has been enhanced, I believe, by a certain amount, but the price will not be enhanced by the same amount by which we alter the duties. The consequence is that where we now throw upon the forward seller of sugar the obligation to pay the customs duty at the port, he may indeed pass it on to his purchaser, but at the same time this purchaser will not be enabled by a corresponding rise of price to recover it from his purchaser. Well, the form which the provision should take with respect to these contracts for future delivery has been very carefully considered by me in consultation with those most competent advisers, the Committee of the Chamber of Commerce; and the form in which the clause is proposed is a form which seems to them the best for the saving of existing contracts, namely, that sugar which has been put on board a steamer at a foreign port before the date of the commencement of this Act—that is to say, before to-day—shall not be affected by the imposition of these new duties. This will postpone for a short time the operation of the Act so far as concerns the protection of the sugar industry, but it will relieve merchants from a good deal of uncertainty regarding their transactions, and from what may be a good deal of unfairness in the operation of the law. Another form which was proposed was simply to exempt from the operation of the Act all sugar which was the subject of a contract made before the Act was introduced. It seemed to me there were strong objections to giving legislation that form, because it is a section of which the operation would not in regular course come to a close by any fixed time. We might have sugar imported a year hence, or two years hence, or even 10 years hence, upon the basis of a contract already made. We cannot postpone the operation of the Act for such an indefinite time, or give to future importations which, as I say, might extend over years, an advantage over other importations, going on at the same time; whereas, if the Council accepts the provision for security of current contracts, which I have laid before them, the result will be that after a very short time—I suppose a month at the outside—the whole of this

temporary exemption will have ceased, and all sugar imported into the country will be under the operation of the Act."

The Honourable MR. ALLAN ARTHUR said:—"I think the amendment proposed by the Honourable Sir James Westland fairly meets the difficulties which I pointed out at the last meeting of the Council might arise in bringing this Bill into operation. I agree with the Honourable Member in regard to what he said as to the difficulty of exempting all contracts that were made before the passing of the Act from the operation of the Act, and I further think it would give the holders of such contracts a greater advantage than they can reasonably claim.

"The holders of contracts for sugar now at sea, *i.e.*, for which bills of lading are signed, will no doubt make a profit on their contracts. Beet sugar has already risen 12 annas per maund, but as the dealers who hold such contracts probably also hold contracts for sugar which will be shipped after the passing of the Act, they will probably make a loss on these latter contracts, as it is improbable that the price of beet sugar will advance to the full extent of the duty imposed. There will be a set-off, however, in the profit on the former contracts against the probable loss on the latter contracts, and, on the whole, I think the amendment meets the difficulties as well as they can be met."

The motion was put and agreed to.

The Honourable SIR JAMES WESTLAND moved that the Bill, as amended, be passed.

His Excellency the PRESIDENT said:—"Before I put the question that this Bill be passed into law I should like to make a few observations with regard to it. I have been glad to notice the complete unanimity that has prevailed with regard to the Bill in this Council—representative as it is of so many diverse and important interests. The Honourable Mr. Mehta indeed would have preferred that this Bill should have been referred to a Select Committee—a contention to which I think that an adequate reply was given by the Honourable Sir James Westland. I also understood him to urge that it might have been desirable that further enquiry should have taken place with respect to the subject-matter of this legislation. Well, I have always heard it made a reproach against the Indian Government that it is perpetually conducting enquiries, and very seldom acting upon them; and that reproach I, at any rate, during my time of administration here, desire to escape.

"The answer to my honourable friend Mr. Mehta is that we have been conducting enquiries for a whole year past. We have received representations from every leading Chamber of Commerce in the country, and from most, if not all, the important firms connected with this industry. We have addressed observations to, and received replies from, the Governments of all the provinces and districts of India concerned. We should have had, if my honourable colleague's advice had been followed, to wait for the best part of another year before we introduced this legislation. We regarded the case as urgent, and we were not prepared to accept such a delay. At the same time I am glad to notice that the Honourable Mr. Mehta, although he delivered this criticism on a point of detail, did not withhold his assent, which I am certain that he is prepared to give, to the general principle of the measure. Then we have had on a previous occasion and again to-day a statement approving the Bill from the Honourable Mr. Allan Arthur, the distinguished representative of European mercantile interests in this capital, and finally we have had two speeches from the Honourable Mr. Chitnavis and the Honourable Mr. Ananda Charlu, which I take it we are entitled to regard as typical of the opinions that are held by those important sections of the Native community which they represent at this table. I am therefore, I think, justified in saying that at any rate within these walls complete unanimity has prevailed with regard to the principle of the Bill.

"This complete unanimity here reflects an almost equally complete unanimity outside. There are, it is true, certain interests and certain Chambers of Commerce—Bombay and Karachi I may name—in which those interests are strongly represented, which have not entirely concurred in the necessity for countervailing duties at this stage. Those representations are entitled to due consideration, but it is to be noted that they do not come from the areas where the sugar-cane is grown, where the refineries

exist, or where the real effect of the bounty system is felt. They represent in the main the interests neither of the producers nor of the consumers, but of the importing merchants. On the other hand, if I regard either the representations to which I have already referred, and which have been received by us from the Local Governments, or the reception which our proposals have met with alike in the English and Native Press of India, I do not hesitate to say that few measures have ever passed through this Council with a greater weight of qualified and homogeneous opinion behind them.

"Now the first point that I desire to emphasise is this—that it is in the interests of India, and of India alone, that this legislation has been proposed by us, and that I have authorised the introduction of this Bill. It may be that our Bill may ultimately affect the action of other countries. It may more immediately touch the interests of certain of our own Colonies as well. The Honourable Sir James Westland in his speech to-day has alluded to the representations that we have received from the Colony of Mauritius, a Colony in which, in view of the enormous Indian population that is there engaged in labour, we here are bound to take a close interest, and whose welfare we should be glad, I am certain, consistently with our own, to subserve. It may be that this Bill will set an example of far-reaching significance. By some it may even be regarded as a factor in the Imperial problem. It is from such points of view that we may expect the measure to be examined, and perhaps criticised, in the British Parliament in London. I do not deprecate such examination, or such criticism, conscious that it will not weaken, but will rather strengthen, our case. All I have to say here is that our conduct has not been determined by those considerations. We are exercising our own legislative competence, of our own initiative, though with the sanction and concurrence of the Secretary of State, to relieve India from an external competition, fortified by an arbitrary advantage, which can be shown to have already produced serious consequences upon our agriculture and manufactures, and which, if unarrested, is likely to produce a continuous and a dangerous decline.

"There is another point upon which I must, in passing, say a word. I have been glad to notice that no one in this Council has ventured upon the argument that we are guilty of an economic heresy in our proposal to meet bounties by a countervailing duty. Bounties are in themselves an arbitrary, and in my opinion a vicious economic, expedient designed in exclusively selfish interests. They are inconsistent with free trade, because they extinguish freedom, and they reverse the natural currents of trade. To meet them by a countervailing duty is to redress the balance and to restore the conditions under which trade resumes its freedom. I do not think that we need pay much attention, therefore, to the mutterings of the high priests at free trade shrines. Their oracles do not stand precisely at their original premium. This is not a question of economic orthodoxy or heterodoxy; it is a question of re-establishing a fiscal balance which has been deflected for their own advantage and to our injury by certain of our foreign competitors.

"Moreover, if the utilitarian basis upon which the doctrines of free trade are supposed in the last instance to rest, *viz.*, that they regard the interests of the greater number, be examined, out of their own mouths would the prophets of those doctrines, in India at any rate, be condemned. For here we are dealing in the case of the sugar-industry with a population the vast majority of which are not consumers of a cheap imported article, but are themselves producers of the raw material, and in their capacity as consumers, consume for the most part the article which they have themselves produced and worked up. In other words, the conditions that prevail in England are completely reversed. The majority in England consists of poor consumers to whom it is indispensable that the price of sugar should be low. The minority consists of capitalist producers. On the other hand, the majority in India consists of poor producers whose industry is at stake; the minority consists of well-to-do consumers of refined sugar who are not likely, in my judgment, to be affected seriously, if indeed they are at all affected, by enhanced prices resulting from our legislation, but who, if they were, could not claim that their interests should override those of the overwhelming majority of the population.

"Now I shall not recapitulate the figures which have been laid before you with so much ability and clearness by the Honourable Sir James Westland when he introduced the Bill at our last meeting; but let me remind you of the facts which have been established in this discussion. They are these:—firstly, that there has in the last few years been an enormous increase in the importation of beet-sugar into India from Germany and Austria—a fact which is unquestionably due to the loss by the American market of those countries in consequence of the imposition of countervailing duties by the Government of the United States in 1897; secondly, that in the same period the rupee price of sugar in this country has seriously fallen; thirdly, that there has been a contraction in nearly every part of India in the area under sugar-cultivation, the total reduction being estimated at as much as 13 per cent; fourthly, that there has been a widespread and a still unarrested closing of native refineries, a phenomenon which is capable of one explanation, and one alone; for while it may be argued that the decline in the total area under cultivation may be partially due to other causes such as famine and the low prices resulting from famine, that this is not the case in respect of the factories which have been closed is demonstrated by the fact that in districts where cultivation has increased, or remained stationary—in other words in districts which have remained unaffected by famine—the refineries nevertheless have been, and still are being, shut.

"From these facts it appears to me to be impossible to draw any other conclusion than that this decline in an Indian industry—in which I have seen it stated that two millions of people are employed and in which the value of the annual crop has been estimated at nearly twenty millions sterling—is due to the importation of beet-sugar at a price below the natural cost of production *plus* the cost of transport, in other words, to the unrestricted competition of a bounty-fed article.

"Now this is a state of affairs which neither the Government of India nor I, as the head of that Government, from whatever point of view we may regard it, can contentedly accept. If we look at it from the point of view of the agriculturist we cannot sit still and look on while he is impoverished by the economic exigencies of Continental nations. If we regard it from the point of view of native manufactures, what would be the meaning and value of the speeches which I have made since I came to India about the encouragement of native enterprise, if I were to acquiesce in the tacit suppression of this promising branch of indigenous industry? We ought, on the contrary, I think, to stimulate and to encourage its development by every means in our power. Finally, if I approach the question from the point of view of the Government, while we should be strangely constituted if we could contemplate with equanimity the preventible growth of an agrarian and industrial grievance, which must sharply react upon the general prosperity of the people, we should also be poor stewards of our own estate if we were to acquiesce in a condition of affairs that must detrimentally affect both the land assessments and the canal returns, and in this way jeopardise the ultimate revenues of the State.

"These are the grounds—which I have endeavoured to state in their wider rather than in their narrower aspect—that have induced the Government of India to introduce this Bill, and that enable me confidently to recommend it to the acceptance of this Council and of the public."

The motion was put and agreed to.

No. 28.

NOTIFICATION IN "GAZETTE OF INDIA, EXTRAORDINARY," MARCH 21ST 1899.

No. 1327 S. R. (Finance and Commerce), dated Calcutta, the 20th March 1899.

In exercise of the powers conferred by section 8A of the Indian Tariff Act, 1894 (VIII. of 1894, as amended by Acts III. of 1896 and XIV. of 1899), the Governor General in Council is pleased to impose, with effect from this date, the following further duties, in addition to those chargeable under No. 8 of the fourth

schedule to the said Act, upon the importation into British India of sugar of the kinds hereinafter specified, produced in or exported from the countries hereinafter mentioned under bounties as hereinafter determined and declared, whether the same is imported directly from the country of production or otherwise, and whether it is imported in the same condition as when exported from the country of production or has been changed in condition by manufacture or otherwise :—

Countries.	Kinds of Sugar.	Bounties bestowed.	Additional Duties to be levied.
			Per cwt. *Rs. a. p.*
Argentine Republic	All kinds	6 centavos per kilogram.	9 2 0
Austria-Hungary...	Sugar under 93 per cent. and of at least 88 per cent. polarization.	1·37 florins per 100 kilograms.	0 14 0
	Sugar under 99½ per cent. and of at least 93 per cent. polarization.	1·46 florins per 100 kilograms.	0 15 0
	Sugar of at least 99½ per cent. polarization.	2·10 florins per 100 kilograms.	1 5 0
Belgium	Raw sugar	4·50 francs per 100 kilograms.	1 6 0
	Refined sugar	5·36 francs per 100 kilograms.	1 10 0
Denmark	Refined sugar	1·12 crowns per 100 kilograms.	0 8 0
France	Raw sugars from 65 to 98 per cent. polarization for beet-root sugars or 65 to 97 per cent. for French colonial sugar.	10·82 francs per 100 kilograms of refined sugar of 100 per cent. polarization.*	3 4 0
	Sugar candies	11·51 francs per 100 kilograms.	3 7 6
	Refined sugars in loaf or crushed, clear, hard and dry.	11·51 francs per 100 kilograms.	3 7 6
	Raw and refined sugars in grains or crystals of a minimum standard of 98 per cent. polarization.	11·17 francs per 100 kilograms.	3 6 0
Germany	Raw sugar of at least 90 per cent. polarization and refined sugar under 98 per cent., and of at least 90 per cent. polarization.	2·50 marks per 100 kilograms.	0 15 3
	Candy and sugar in white, hard loaves, blocks, crystals, &c., of at least 99½ per cent. polarization.	3·55 marks per 100 kilograms.	1 6 0
	All other sugar of at least 98 per cent. polarisation.	3 marks per 100 kilograms.	1 2 0
Holland	Raw beet sugar of less than 98 per cent. polarization.	2·2354 florins per 100 kilograms of hard refined (100 per cent.).*	1 7 0
	Raw beet sugars of at least 98 per cent. polarization.	¾ths of above bounty, or 1·7655 florins per 100 kilograms of hard refined.*	1 2 0
	Refined beet-root sugars	0·2946 florins per 100 kilograms of hard refined, in addition to above rate.	0 3 0 in addition to above rate.
	Refined sugar from materials other that beet-root raw sugar.		
Russia	Sugar of at least 99 per cent. polarization.	0·50 rouble per pood (36·113 lbs. avoidupois).	3 11 0
	Sugar of less than 99 per cent. polarization, but not less than 88 per cent.	0·44 rouble per pood.	3 4 0
	Sugar of less than 88 per cent., but not less than 75 per cent.	0·38 rouble per pood.	2 13 0

* The output of refined sugar from raw is computed by deducting from the polarization of the raw sugar twice the glucose, four times the ashes, and one and a half per cent. for loss in refining.

H. H. RISLEY,
Officiating Secretary to the Government of India.

STATISTICS.

No. 29.

Estimated Area under Sugar-cane in India.

The appended table has been compiled from the latest available returns. It deals exclusively with the sugar-cane area. There is besides a considerable area under sugar palms in the Southern Presidencies and Bengal, which appears under the head of "Other sugars" in the Agricultural Statistics.* The 2,500,000 acres mentioned in Dr. Watt's Dictionary include the sugar-palm area, and were taken from a Resolution of this Department published in 1889, when the area and crop returns were very defective. Dr. Watt's Dictionary was cited in the Government of India's Circular of 31st October, 1898, as being the nearest authority to hand. The Circular was issued under pressure of time, and in the then stage of the countervailing duties question, exact ascertainment of the sugar-cane area was not a matter of primary importance. Now that the stage of action has been reached, it is important to verify the areas. The return for Bengal is to a great extent founded on conjecture, as there is no detailed survey on which the annual crop returns can be based. Subject to this uncertainty the estimate of 3,000,000 acres may be accepted as approximately correct, as the appended table shows. In addition to the areas shown in the table, there are large tracts for which statistics are not available, *i.e.*, the zemindaris of Madras and the Native States of Central India, Rajputana (excluding Jaipur), Hyderabad, and Southern India. For the zemindari area of Madras 40,000 acres was taken in 1889 as an approximate estimate. The sugar-cane area of the Native States may be put at about 300,000 acres.

The estimates of outturn (one ton of *gur* or unrefined sugar) and of value (Rs. 100) per acre adopted in this Department Circular, are generally borne out by the Director's report for the North-Western Provinces. He takes the outturn at 30 maunds (=1·06 tons) per acre, and values this, at present low prices, at a little under Rs. 100.

* The area under sugar-yielding palms, &c., was 136,947 acres in 1893–94; 124,574 acres in 1894–95; 135,396 acres in 1895–96; and 137,492 acres in 1896–97.

Estimated Area under Sugar-cane in India (in Acres).

Province.	Years.							
	1891–92.	1892–93.	1893–94.	1894–95.	1895–96.	Average, 1891–92 to 1895–96.	1896–97.	1897–98.
British Provinces.								
Burma, Upper	900	5,800	2,300	2,000	2,400	2,680	1,910	1,257
„ Lower ...	10,100	9,500	10,100	10,100	13,000	10,560	12,368	11,190
Assam	18,500	19,700	17,400	18,400	17,000	18,200	20,568	21,340
Bengal	1,159,900	1,071,200	1,030,600	967,300	944,600	1,034,720	839,800	1,000,000‡
North-Western Provinces.	1,067,300	962,000	1,061,500	978,300	1,099,200	1,033,660*	967,699	935,902
Oudh	295,500	247,300	260,900	255,700	289,800	269,840*	246,460	212,252
Ajmere-Merwara ...	235	132	625	1,258	1,057	661	498	323
Punjab	364,000	314,200	327,600	339,900	385,900	346,320*	398,202	348,121
Sindh	3,000	3,100	3,500	3,300	3,500	3,280*	3,180	2,832
Bombay	75,100	68,000	83,500	84,600	71,200	76,480*	66,178	54,060
Central Provinces ...	44,600	42,400	36,000	37,500	40,800	40,260	34,760	26,953
Berar	2,700	3,900	5,300	4,000	3,600	3,900	2,133	3,159
Madras	58,400	51,200	57,700	62,200	58,600	57,620	57,916	58,374
Coorg	—	—	—	—	—	—	—	—
Total	3,100,235	2,798,432	2,897,025	2,764,558	2,930,657	2,898,181	2,651,672	2,675,763
Native States for which Returns are available.								
Pargana Manpur (Central India).	85	89	98	83	70	85	49	35
Mysore	32,200	32,500	34,800	32,600	37,000	33,820	31,785	26,952
Jaipur	—	1,000	1,100	1,200	2,400	1,425	1,450†	1,471
	—	—	—	—	—	2,933,511	2,684,956	2,704,221

Note.—The year 1896–97 was a year of drought.

* These figures are practically the same as those given in the recent special reports.
† Estimated.
‡ Based on average. Return for 1897–98 not yet received.

No. 30.

Statement of the Trade in Sugar, both by Sea and by Land, of British India since 1884–85 *(quantity in cwts).*

YEAR.	Imports by Sea.								Re-exports by Sea to Foreign Countries.		Exports by Sea of Indian Produce.		Frontier Trade.			
	From Austria-Hungary.	From Germany.	From Mauritius.		From other Countries.		Total.						Imports.		Exports.	
	Refined.*	Refined.	Refined.	Unrefined.	Refined.	Unrefined.	Refined.	Unrefined.	Refined.	Unrefined.	Refined.	Unrefined.	Refined.	Unrefined.	Refined.	Unrefined.
1884–85	14,904	908	1,265,362	575	331,893	3,232	1,613,067	3,807	180,140	—	55,323	1,015,596	66	308,981	53,998	79,914
1885–86	—	—	890,545	6,247	273,511	883	1,164,056	7,130	163,343	220	24,942	1,142,598	153	254,778	51,332	82,313
1886–87	9,899	59	1,310,250	66,791	358,282	4,274	1,678,490	71,065	158,312	—	33,340	953,066	150	198,610	101,102	89,952
1887–88	4,380	6,881	1,205,465	91,183	498,276	2,294	1,715,002	93,477	149,516	1	37,723	1,008,565	192	282,250	85,635	112,388
1888–89	196	—	1,243,224	162,991	207,061	4,238	1,450,481	167,229	169,725	—	34,523	978,955	1,623	296,296	99,421	107,262
1889–90	3,087	40,734	1,277,119	89,240	302,681	10,252	1,623,621	99,492	195,346	6	111,323	1,309,321	43	2,348	34,639	82,487
1890–91	31,374	709,195	1,345,383	149,562	648,539	47,848	2,734,491	197,410	160,568	—	28,768	795,973	80	5,762	47,523	79,844
1891–92	22,505	242,705	1,329,138	142,778	474,637	1,362	2,068,985	144,140	159,568	—	37,044	940,574	215	3,370	55,661	101,803
1892–93	27,698	255,788	968,732	109,826	595,698	2,076	1,847,916	111,902	228,666	—	37,461	798,773	295	6,421	63,509	89,334
1893–94	11,549	189,301	1,268,371	93,278	562,033	3,373	2,031,254	96,651	234,669	—	146,946	1,150,635	155	2,145	57,543	85,341
1894–95	7,093	274,632	1,559,594	193,409	454,874	1,009	2,296,193	194,418	213,966	5	60,179	958,107	209	2,731	66,378	98,584
1895–96	4,934	718,218	1,366,733	205,260	435,089	729	2,524,974	205,989	176,830	—	41,934	1,021,832	540	3,140	55,326	116,529
1896–97	115,514	758,806	1,488,851	177,994	319,292	943	2,682,463	178,937	188,308	—	62,963	1,097,202	277	3,767	70,749	128,803
1897–98	945,745	1,203,309	1,406,947	371,969	680,293	1,267	4,235,394	373,236	103,445	—	37,887	548,895	309	3,143	53,353	104,358
1898–99 (11 months)	921,804	396,352	1,592,636	†	472,489	†	3,383,281	312,770	156,015	—	39,257	252,673	300‡	1,090‡	59,172‡	80,073‡

* Refined or crystallised, including sugar-candy and confectionery.
† Details not shown in Monthly Accounts of Trade.
‡ Nine months.

In the following tables Refined Sugar includes crystallised sugar and sugar-candy, while Unrefined Sugar includes molasses and *jaggery* or *gur* and other saccharine produce.

No. 31.

Quantities of Sugar (Refined or Unrefined) imported by sea into India from various Countries; in Cwts.

Countries.	1890-91.	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.	1897-98.	1898-99. (11 mos.)
Mauritius {Refined	1,345,383	1,329,138	968,732	1,268,371	1,559,594	1,366,733	1,488,851	1,406,047	1,592,636
Mauritius {Unrefined	149,562	142,778	109,826	93,278	193,409	205,260	177,994	371,969	*
Germany (Refined)	709,195	242,705	255,788	189,301	274,632	718,218	758,806	1,203,309	396,352
Austria-Hungary (Refined) ..	31,374	22,505	27,698	11,549	7,093	4,934	115,514	945,745	921,804
China, Hong Kong (Refined) ..	195,912	177,416	349,093	351,294	220,496	206,049	139,310	291,175	173,956
Java {Refined	20,045	127,771	80,379	99,976	140,030	109,998	97,458	140,485	162,500
Java {Unrefined	40,053	—	—	—	—	—	—	—	—
United Kingdom (Refined) ..	281,196	30,201	21,742	6,129	5,852	7,692	12,322	46,384	*
Straits Settlements {Refined ..	114,467	123,513	129,459	86,741	81,418	107,743	63,322	74,357	68,557
Straits Settlements {Unrefined	4,477	248	147	132	79	302	175	555	*
Ceylon {Refined	571	119	3,527	14,104	6,551	670	121	48,965	*
Ceylon {Unrefined	1,364	963	1,394	3,057	842	152	277	656	*
Egypt (Refined)	8	2	—	177	—	503	1	44,274	*
France (Refined)	9,356	15,409	317	233	488	433	115	23,325	*
Belgium (Refined)	25,044	1	2,107	325	—	1,064	5,940	9,205	*
Other Countries (Refined and Unrefined.)	3,894	356	9,609	3,238	127	1,212	1,194	1,679	*380,246
Total, Refined	2,734,491	2,068,985	1,847,916	2,031,254	2,296,193	2,524,974	2,682,463	4,235,394	3,383,281
„ Unrefined	197,410	144,140	111,902	96,651	194,418	205,989	178,937	373,236	312,770
Grand Total	2,931,901	2,213,125	1,959,818	2,127,905	2,490,611	2,730,963	2,861,400	4,608,630	3,696,051
of which : Known to be Bounty-fed ..	774,969	280,620	285,910	201,408	282,213	724,649	880,375	2,182,084	1,318,156

* Details not shown in Monthly Accounts of Trade.

NOTE.—Imports of beet-root sugar on a large scale did not begin until 1890–91. The quantity imported in 1887–88 was cwts. 12,606, in 1888–89, cwts. 2,355, and in 1889–90, cwts. 51,297.

No. 32.

Quantities of Sugar (Refined and Unrefined) imported by sea into each Province; in Cwts.

Provinces.	1890-91.	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.	1897-98.	1898-99 (11 mos.)
Bengal {Refined	511,796	408,237	217,851	339,255	440,085	490,779	488,985	1,064,607	1,203,135
Bengal {Unrefined	192,840	139,744	108,525	91,166	191,967	202,362	177,273	366,281	
Bombay and Sind {Refined ..	2,085,955	1,560,829	1,519,475	1,616,358	1,783,969	1,959,221	2,098,824	2,963,649	2,311,145
Bombay and Sind {Unrefined ..	3,135	3,387	1,907	2,294	1,519	3,163	1,210	5,889	
Madras {Refined	7,561	5,717	2,867	10,029	3,695	4,133	3,158	7,026	10,242
Madras {Unrefined	1,370	979	1,395	3,059	842	304	277	664	
Burma {Refined	129,179	94,202	107,723	65,612	68,444	70,841	91,496	200,112	171,529
Burma {Unrefined	65	30	75	132	90	160	177	462	
Total	2,931,901	2,213,125	1,959,818	2,127,905	2,490,611	2,730,963	2,861,400	4,608,630	3,696,051

No. 33.

Value of Sugar (Refined and Unrefined) imported by Sea into India from various Countries; in Rx.

Countries.	1890-91.	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.	1897-98.	1898-99 (11 mos.).
Mauritius { Refined	1,630,319	1,640,191	1,390,849	1,732,104	1,898,565	1,645,538	1,717,841	1,566,010	1,639,279
Mauritius { Unrefined	36,083	44,416	32,870	24,839	38,858	41,509	35,750	75,028	*
Germany (Refined)	840,271	292,032	367,336	276,155	345,144	875,023	875,739	1,278,805	415,723
Austria-Hungary (Refined)	36,984	27,197	42,322	17,614	9,325	6,358	131,379	1,044,504	941,139
China, Hong Kong (Refined)	261,351	216,749	475,513	513,329	295,098	266,190	179,151	334,838	196,700
Java { Refined	16,036	121,980	80,531	99,976	168,037	131,398	99,256	175,486	170,240
Java { Unrefined	31,292	—	—	—	—	—	—	—	*
United Kingdom (Refined)	343,236	38,084	31,875	9,898	8,183	9,583	23,156	86,462	*
Straits Settlements { Refined	150,012	159,046	181,837	123,732	102,087	125,396	76,790	81,301	80,457
Straits Settlements { Unrefined	4,494	200	157	129	98	182	166	351	*
Ceylon { Refined	788	149	5,415	19,996	8,465	945	176	55,408	*
Ceylon { Unrefined	555	478	525	1,056	334	40	101	269	
Egypt (Refined)	12	4	—	319	—	570	5	46,663	*
France (Refined)	14,620	21,126	600	494	1,000	839	308	27,365	*
Belgium (Refined)	30,486	3	2,787	548	—	1,624	7,286	10,032	*
Other Countries (Refined and Unrefined).	3,347	340	13,066	4,001	103	1,618	4,725	1,957	*177,255
Total, Refined	3,326,850	2,516,803	2,591,816	2,798,063	2,835,960	3,064,935	3,111,918	4,708,793	3,557,310
„ Unrefined	73,036	45,192	33,867	26,127	39,337	41,878	39,911	75,686	63,483
Grand Total	3,399,886	2,561,995	2,625,683	2,824,190	2,875,297	3,106,813	3,151,829	4,784,479	3,620,793
of which Known to be bounty-fed	922,361	340,358	413,045	294,811	355,469	883,844	1,014,712	2,360,706	1,356,862

* Details not shown in Monthly Accounts of Trade.

No. 34.

Quantity of Foreign Refined Sugar Re-exported; in Cwts.

Countries.	1890-91.	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.	1897-98.	1898-99. (11 mos.).
Persia	78,156	72,308	126,999	90,777	96,619	72,365	75,311	47,771	77,691
Arabia	28,574	24,042	31,447	32,819	40,403	43,383	41,981	21,304	24,715
Aden	19,876	24,871	19,713	22,290	25,790	14,706	21,363	10,960	†
East Coast of Africa (Mozambique, Zanzibar, &c.).	13,054	11,627	10,862	11,180	9,261	12,476	12,856	9,418	†
Turkey in Asia	17,582	23,191	34,112	31,471	36,496	29,494	34,187	11,620	22,230
Other Countries	3,326	3,529	5,533	*46,132	5,397	4,406	2,610	2,372	†31,379
Total	160,568	159,568	228,666	234,669	213,966	176,830	188,308	103,445	156,015
Re-exports from— Bombay and Sind	160,372	159,367	228,432	233,858	213,907	176,650	188,171	102,284	†
Other Provinces	196	201	234	811	59	180	137	1,161	†
Total	160,568	159,568	228,666	234,669	213,966	176,830	188,308	103,445	156,015

* Re-exports of beet-sugar to London explain this increase.
† Details not shown in Monthly Accounts of Trade.

No. 35.

Value of Foreign Refined Sugar Re-exported; in Rx.

Countries.	1890-91.	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.	1897-98.	1898-99 (11 mos.).
Persia	96,647	86,983	184,633	130,164	123,018	87,072	90,905	54,447	85,634
Arabia	34,884	28,999	44,226	45,963	50,490	53,068	49,670	24,339	26,778
Aden	24,449	29,969	26,673	32,462	33,322	17,821	25,389	12,211	†
East Coast of Africa (Mozambique, Zanzibar, &c.).	16,026	14,125	15,636	15,513	11,352	15,727	15,535	11,105	†
Turkey in Asia	21,402	28,122	49,216	43,714	46,196	37,172	42,987	13,931	24,839
Other Countries	4,251	4,429	7,696	*70,346	7,156	5,712	3,401	2,906	†35,240
Total	197,659	192,627	328,080	338,162	271,534	216,572	227,887	118,939	172,491

* Re-exports of beet-sugar to London explain this increase. † Details not shown in Monthly Accounts of Trade.

No. 36.

Quantity of Indian Sugar Exported by Sea to various Countries; in Cwts.

Countries.	1890-91.	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.	1897-98.	1898-99 (11 mos.).
United Kingdom { Unrefined ..	756,438	779,823	698,771	940,122	855,657	976,687	1,028,514	447,070	221,816
United Kingdom { Refined ..	146	239	667	106,850	15,266	1,101	28,474	73	1
Aden { Unrefined	13,611	10,517	11,560	12,608	12,025	9,499	10,636	11,112	†
Aden { Refined	3,137	3,737	6,000	4,521	3,553	2,259	2,275	2,943	†
Arabia { Unrefined	13,024	17,363	6,885	8,048	9,355	19,060	17,049	1,500	†
Arabia { Refined	1,541	964	1,572	1,749	2,500	4,592	1,298	1,019	†
Ceylon { Unrefined	10,659	13,856	13,252	16,979	11,535	13,275	11,838	15,914	†
Ceylon { Refined	16,216	26,195	23,198	26,317	33,048	27,555	23,164	27,451	26,862
Egypt { Unrefined	131	64,399	50,531	82,916	75	25	26,572	71,725	32
Egypt { Refined	21	4	5	12	32	13	19	8	†
Other Countries (Refined and Unrefined).	9,817	*60,521	23,793	*97,459	*75,300	9,700	10,326	7,967	†43,219
Total, Unrefined	795,973	940,574	798,773	1,150,635	958,107	1,021,832	1,097,202	548,895	252,673
„ Refined	28,768	37,044	37,461	146,946	60,179	41,934	62,963	37,887	39,257
Grand Total	824,741	977,618	836,234	1,297,581	1,018,286	1,063,766	1,160,165	586,782	291,930
Exports from— Madras { Unrefined	780,283	908,246	763,708	1,097,160	928,956	990,900	1,067,697	535,992	†
Madras { Refined	15,202	24,580	21,031	50,171	30,339	27,359	40,338	26,190	†
Other Provinces (Unrefined and Refined).	29,256	44,792	51,495	150,250	58,991	45,507	52,130	24,600	†
	824,741	977,618	836,234	1,297,581	1,018,286	1,063,766	1,160,165	586,782	291,930

* The increased figures in these years were due to exceptional shipments to America.
† Details not shown in Monthly Accounts.

No. 37.

Value of Indian Sugar Exported by Sea to various Countries; in Rx.

Countries.	1890-91.	1891-92.	1892-93.	1893-94.	1894-95.	1895-96.	1896-97.	1897-98.	1898-99 (11 mos.).
United Kingdom { Unrefined ..	349,569	377,515	385,632	568,214	419,870	490,679	578,612	188,643	106,440
United Kingdom { Refined ..	258	341	855	135,179	17,514	1,039	20,444	121	6
Aden { Unrefined	11,595	9,086	8,971	10,440	9,879	7,564	8,552	9,879	†
Aden { Refined	4,075	5,384	8,546	6,801	5,201	3,614	3,803	4,616	
Arabia { Unrefined	10,903	14,011	5,685	5,809	7,346	14,268	12,781	1,085	†
Arabia { Refined	2,309	1,460	2,598	3,061	3,705	5,035	2,096	1,568	†
Ceylon { Unrefined	5,786	6,456	6,569	7,621	4,518	4,943	5,288	8,537	†
Ceylon { Refined	19,557	30,883	31,744	37,390	43,232	34,315	28,132	32,913	30,638
Egypt { Unrefined	105	27,856	30,354	49,650	60	20	15,107	33,474	32
Egypt { Refined	34	7	9	23	58	26	36	14	†
Other Countries (Refined and Unrefined).	13,371	*35,418	26,951	*68,553	*39,202	13,242	13,698	11,604	†39,216
Total, Unrefined	379,187	461,303	454,272	698,240	471,080	519,994	622,264	242,965	126,600
„ Refined	38,375	47,114	53,642	194,501	79,503	54,751	66,285	49,489	49,732
Grand Total	417,562	508,417	507,914	892,741	550,583	574,745	688,549	292,454	176,?

* The increased figures in these years were due to exceptional shipments to America.
† Details not shown in Monthly Accounts

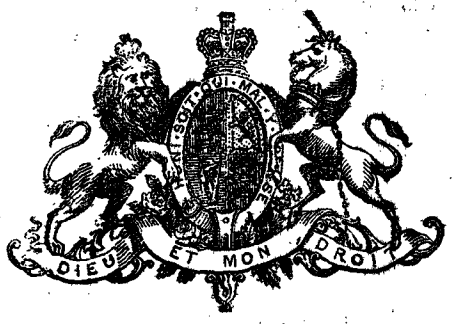
RULES AND APPLIED ENACTMENTS

ISSUED BY THE

GOVERNMENT OF INDIA.

16th JUNE, 1899.

Presented to both Houses of Parliament by Command of Her Majesty.



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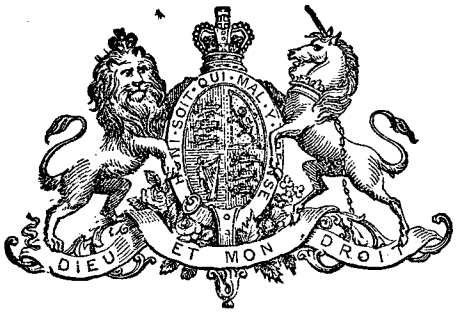

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GENERAL ORDERS.—MILITARY DEPARTMENT.

Simla, 16*th June*, 1899.

In exercise of the powers conferred by sections 25, 26, and 27 of the Cantonments Act, 1889 (XIII. of 1889), the Governor-General in Council is pleased to direct that, on and with effect from the first day of October, 1899, the following rules and applied enactments shall be in force in every cantonment in British India, other than Aden, save in so far as it may be for the time being excepted from the operation of any such rule in pursuance of an order made under subsection (2) of the said section 27.

2. On and with effect from the date aforesaid, the rules, regulations and notifications herein-after set forth shall be cancelled and cease to have effect, that is to say :

(1) all rules and regulations made under—

(*a*) Act XXII. of 1864 (*an Act to make provision for the adminstration of military cantonments*) ;

(*b*) Madras Act IV. of 1865 (*an Act to make provision for the administration of military cantonments in the Presidency of Fort St. George*) ;

(*c*) Madras Act I. of 1866 (*an Act to repeal Madras Act IV. of 1865 and to make provision for the administration of miltiary cantonments in the Presidency of Fort St. George*) ;

(*d*) the Bombay Cantonment Act of 1867 (Bombay Act III. of 1867) ; and

(*e*) the Cantonments Act, 1880 (III. of 1880), sections 25 and 26 ; and

(2) the following Notifications of the Government of India in the Military Department, namely :

(*a*) Notification No. 597, dated the 22nd May, 1896 ;

(*b*) Notification No. 723, dated the 19th June, 1896 ;

(*c*) Notification No. 1,117, dated the 9th October, 1896 ;

(*d*) Notification No. 26, dated the 8th January, 1897 ;

(*e*) Notification No. 162, dated the 5th February, 1897 ;

(*f*) Notification No. 1,148, dated the 15th October, 1897 ; and

(*g*) Notification No. 229, dated the 3rd March, 1899.

THE CANTONMENT CODE, 1899

CHAPTER I.

PRELIMINARY.

Short Title.

Short title.

1. These rules and applied enactments may be called the Cantonment Code, 1899.

General Definitions.

Definitions.

2. (1) In this Code, unless there is anything repugnant in the subject or context,—

(*a*) "Accountant-General" means the Civil Accountant-General or Comptroller :

(*b*) "bazar" means any land in a cantonment which has been set apart for the purposes of trade or the residence of natives or any other purpose, and the boundaries of which have been demarcated by pillars or posts and specified, by or under the authority of the General Officer of the Command, in Command Orders :

(*c*) "Command" means one of the principal portions into which the Army in India is for the time divided :

(*d*) "dairy" includes every farm, shed, milk-store, milk-shop or other place from which milk is supplied, or in which milk is kept for purposes of sale :

(*e*) "dairyman" includes the keeper of a cow, buffalo, goat, ass or other animal, the milk of which is offered, or intended to be offered, for sale for human consumption, any purveyor of milk and any occupier of a dairy :

(*f*) "Executive Engineer" means the Public or Military Works officer of that grade having charge of the military works in the cantonment, and includes the officer, of whatever grade, in immediate executive engineering charge of a cantonment :

(*g*) "General Officer of the Command" means the General Officer commanding the Forces in the Command :

(*h*) "infectious or contagious disorder" includes cholera, leprosy, enteric fever and every infectious or contagious disorder other than a venereal disease :

(*i*) "keeper of sarai" includes the owner of a sarai, any person having the care or management of a sarai and the lessee of any land, whether belonging to the Government or not, occupied by a sarai :

(*j*) "lessee" means a person who has been granted permission, whether before or after the commencement of this Code, to occupy for the purposes of a building-site, land belonging to the Government in a cantonment, and includes the successors in interest of a lessee :

(*k*) "licensed market" means a private market licensed by the cantonment authority :

(*l*) "licensed slaughter-house" means a private slaughter-house licensed by the cantonment authority :

(*m*) "market" means a place in a cantonment where persons periodically assemble for purposes of selling meat, fish, fruit, vegetables, milk, or any other perishable articles of food for human consumption :

(*n*) "notification" means a notification in the local official Gazette :

(*o*) "notified" means published by notification :

(*p*) "private market" means a market not maintained by the cantonment authority.

(*q*) "private slaughter-house" means a slaughter-house not maintained by the cantonment authority.

(*r*) "public market" means a market maintained by the cantonment authority :

(*s*) "public slaughter-house" means a slaughter-house maintained by the cantonment authority.

(*t*) "regimental bazar" means a bazar under the management of regimental authorities :

(*u*) "Sanitary Officer" means, where no sanitary officer has been specially appointed, the senior executive Medical Officer in military employ on duty in a cantonment :

(*v*) "sarai" means a building in a cantonment ordinarily used, whether wholly or in part, for the accommodation of native travellers and not maintained by the cantonment authority :

(*w*) "slaughter-house" means a place in a cantonment ordinarily used for the slaughter of animals for the purpose of selling the flesh for human consumption :

(*x*) "source of public water-supply" includes every public well, tank, river, stream, spring, channel, reservoir or other source in a cantonment from which water is or may be made available for public use, whether or not it is used for the purposes of water-works, and also every source of water-supply situate on private premises to the use of which the public is entitled :

(*y*) "street" includes any way, road, lane, square, court, alley, passage or open space in a cantonment, whether a thoroughfare or not, and whether built upon or not, over which the public have a right of way, and also the roadway and footway over any bridge or causeway : and

(*z*) "treasury" means the Government treasury or sub-treasury, or the bank or place prescribed by or under section 22 of the Cantonments Act, 1889, for the custody of the cantonment fund of a cantonment.

XIII. of 1889.

(*2*) Where any question arises as to whether a building is or is not a sarai, or a place is or is not a slaughter-house, it shall be decided by the cantonment authority ; and the decision of the cantonment authority thereon shall be final and conclusive.

CHAPTER II.

CANTONMENT COMMITTEES AND CONTROL.

Constitution.

Ordinary members of cantonment committee.

3. (*1*) In every cantonment with respect to which the Local Government has determined that a cantonment committee is to be constituted, the cantonment committee shall ordinarily consist of the following members, namely :

(*a*) the Commanding Officer of the cantonment or, where he is the Officer Commanding the District, the officer who would succeed to the command of the cantonment during his temporary absence ;

(*b*) any Magistrate of the first class, being also a Justice of the Peace, appointed by the District Magistrate to represent him ;

(*c*) such Commanding Officers in the cantonment as may be appointed in Station Orders to be members ;

(*d*) the Cantonment Magistrate ;

(*e*) the Sanitary Officer ;

(*f*) the Executive Engineer ; and

(*g*) the District Superintendent of Police.

(*2*) The Commanding Officer of the cantonment or, where he is the officer Commanding the District, the officer who would succeed to the command of the cantonment during his temporary absence, shall be the President, and the Cantonment Magistrate shall be the Secretary, of the committee.

(*3*) If the President is absent from any meeting, the next senior combatant officer present shall preside on that occasion.

Additional members of cantonment committee.

4. The General Officer of the Command may, by order in writing, appoint any residents of the cantonment, whether officials or non-officials, to be additional members of the cantonment committee for such period as may be stated in the order.

Cantonment committee (if any) to discharge functions of cantonment authority.

5. The cantonment committee (if any) shall discharge the functions of the cantonment authority under this Code.

Provision where there is no cantonment committee.

6. (1) The Governor General in Council, after consultation with the Local Government and the General Officer of the Command, may, by notification, direct, in respect of any cantonment in which a cantonment committee has not been constituted or has ceased to exist or cannot be convened, that any of the functions of the cantonment authority under this Code—

(*a*) shall be in abeyance ; or

(*b*) shall, with such modifications as may be prescribed in the notification, be discharged by the Commanding Officer of the cantonment.

(2) Subject to any notification for the time being in force under sub-section (1), the Commanding Officer of any such cantonment as aforesaid may discharge any of the functions of the cantonment authority under this Code.

Meetings of Cantonment Committee.

Time and place of meetings, and notice of business.

7. (1) The cantonment committee (if any) shall meet for the transaction of business once at least in every month, and at such other times as the President may direct.

(2) The time and place of each meeting shall be announced in Station Orders, and shall be communicated to each member by a notice in writing issued by the Secretary.

(3) Every notice issued under sub-section (2) shall,—

(*a*) unless the President in any case otherwise directs, be issued so as to reach each member three clear days before the meeting takes place ; and

(*b*) be accompanied by an agenda paper specifying the business to be transacted at the meeting.

(4) The President may permit the consideration of any business not specified in the agenda paper as aforesaid, unless a majority of the members require its postponement to a later meeting.

(5) The President may, by order in writing, adjourn any meeting to any date to be fixed by the order.

Six days' notice required in certain cases.

8. No business relating to the imposition, abolition or modification of any tax shall be transacted at a meeting unless at least six clear days' notice in writing of the date fixed therefor has been given.

Quorum.

9. No business shall be transacted at a meeting unless there are present, in addition to the President,—

(*a*) three members of the committee, or

(*b*) half the total number of members,

whichever number is the greater.

Minutes of proceedings to be kept.

10. (1) Minutes of the proceedings at each meeting shall be recorded in a book, shall be signed by the President, and shall, at such times and in such place as shall be fixed by the cantonment committee, be open, free of charge, to the inspection of any inhabitant of the cantonment.

(2) A copy of the minutes shall, as soon as possible after each meeting, be forwarded for the information of the District Magistrate.

Meetings to be public.

11. Every meeting shall be open to the public, unless in any case the President, for reasons to be recorded in the minutes, otherwise directs.

12. (1) All questions coming before a meeting shall be decided by a majority of the votes of the members present and voting.

Decision by majority of votes.

(2) In the case of an equality of votes, the President shall have a second or casting vote.

(3) The dissent of any member from any decision of the cantonment committee, with an abstract of the grounds therefor, shall, if the member so requests, be entered by the Secretary in the minutes.

Control.

13. (1) If the President dissents from any decision of the cantonment committee, he may, for reasons to be recorded in the minutes, by order in writing, direct the suspension of action thereon for any period not exceeding one month ; and, if he does so, he shall forthwith refer the matter to the Officer Commanding the District.

Power of President and District Magistrate to suspend action pending reference to higher authority.

(2) If the District Magistrate considers any decision of the cantonment committee to be prejudicial to the public health, safety or convenience, he may, whether on a report made by the Magistrate representing him on the cantonment committee or otherwise, after giving notice in writing of his intention to the President, refer the matter to the Local Government through the Commissioner (if any) of the Division ; and the President shall, on receipt of such notice, direct the suspension of action on the decision pending the disposal of the reference to the Local Government, and shall forthwith report the matter to the General Officer of the Command through the Officer Commanding the District.

(3) If the Magistrate appointed to represent the District Magistrate on the cantonment committee is present at a meeting and dissents from any decision which he considers prejudicial to the public health, safety or convenience, he may, for reasons to be recorded in the minutes and after giving notice in writing of his intention to the President, report the matter to the District Magistrate ; and the President shall, on receipt of such notice, direct the suspension of action on the decision for a period sufficient to admit of the District Magistrate being communicated with and taking proceedings as provided by sub-section (2),

Controlling powers of Officer Commanding the District.

14. (1) The Officer Commanding the District may, by order in writing,—

(*a*) call for any book or document in the possession or under the control of the contonment authority ;

(*b*) require the cantonment authority to furnish such statements, accounts, reports and copies of documents relating to its proceedings or duties as he may think fit ;

(*c*) require the cantonment authority to furnish plans and estimates for all works to be constructed out of the cantonment fund at a cost exceeding five hundred rupees, and to conform to such directions as he may think fit to give with respect to the superintending authority by whom such works shall be approved ; and

(*d*) direct that any matter or any specific proposal, other than one which has been referred to the Local Government under section 13, sub-scction (2), be brought before the cantonment committee.

(2) The Officer Commanding the District may, by a like order,—

(*e*) direct the suspension, for such period as may be stated in the order, of action on any decision of the cantonment committee which has not been referred to him under section 13, sub-section (1) ; or

(*f*) when any decision of the cantonment committee has been referred to him under section 13, sub-section (1), either—

(i) cancel the order given by the President directing the suspension of action, or

(ii) extend its duration for such period as may be stated in his order, or

(iii) declare the modifications with which the decision may be carried into effect by the cantonment committee.

(3) When the Officer Commanding the District directs the suspension of action on any decision of the cantonment committee, or extends the duration of any order of suspension, he shall forthwith refer the matter to the General Officer of the Command.

Controlling powers of General Officer of the Command.

15. The General Officer of the Command may, by order in writing,—

(*a*) exercise any of the powers conferred by section 14, sub-section (1), on the Officer Commanding the District;

(*b*) direct the suspension, for such period as may be stated in the order, of action on any decision of the contonment committee which has not been reported to him under section 13, sub-section (2), or referred to him under section 14, sub-section (3); or

(*c*) when any decision of the cantonment committee has been referred to him under section 14, sub-section (3), either—

(i) cancel the order given by the President or the Officer Commanding the District, as the case may be, directing the suspension of action, or

(ii) extend the duration of the order for such period as may be stated in his order, or

(iii) declare the modifications with which the decision may be carried into effect by the cantonment committee.

Controlling powers of Local Government.

16. When any decision of the cantonment committee has been referred to the Local Government under section 13, sub-section (3), the Local Government shall consult the General Officer of the Command and may then, by order in writing, either—

(*a*) cancel the order given by the President directing the suspension of action; or

(*b*) extend its duration for such period as may be stated in its order; or

(*c*) direct that no action be taken on the decision; or

(*d*) declare the modifications with which the decision may be carried into effect by the cantonment committee.

CHAPTER III.

The Cantonment Magistrate and Cantonment Servants.

Cantonment Magistrate.

Position and general duties of Cantonment Magistrate.

17. (1) The Cantonment Magistrate shall be the executive officer of the cantonment authority, and all orders of the cantonment authority shall be issued through him.

(2) The Cantonment Magistrate shall see that all orders of the cantonment authority are duly obeyed.

(3) The Cantonment Magistrate shall, as far as practicable, keep a record of every final order issued by him in his official capacity.

Cantonment Servants.

Number and salaries of servants of cantonment authority.

18. (1) With the previous sanction of the General Officer of the Command and subject to the provisions of sections 30 and 33 and to the control over the cantonment fund which is vested in the Local Government by section 23 of the Cantonments Act, 1889, the cantonment authority shall fix the number and salaries of the servants to be employed by it.

XIII. of 1889.

(2) Every alteration in the number of such servants or in their salaries shall be subject to the sanction and control aforesaid:

Provided that temporary servants may, in cases of emergency and if funds are available, be employed without such sanction for any period not exceeding three months.

Explanation.—Nothing in this section shall be deemed to apply to the police employed in a cantonment beyond the limits of a Presidency-town, or to affect the provisions relating to the employment and constitution of the police-force of—

XIII. of 1889. (*a*) the Cantonments Act, 1889, section 12 ;

V. of 1861. (*b*) Act XXIV of 1859, section 8 ;

(*c*) the Police Act, 1861, section 2 ;

Bo. Act VII of 1876 (*d*) the Bombay District Police Act, 1867, section 3 ;

(*e*) Bengal Act VII of 1869 ;

III. of 1888. (*f*) the Police Act, 1888 ; and

Bo. Act IV. of 1890. (*g*) the Bombay District Police Act, 1890, section 4.

Register of menial servants of cantonment authority.

19. The Cantonment Magistrate shall maintain such public register of menial servants employed by the cantonment authority as may be instituted by that authority.

Appointment and supervision of servants of cantonment authority.

20. The Cantonment Magistrate shall—

(*a*) appoint all servants required by the cantonment authority ;

(*b*) apportion, control and superintend the performance of the duties of all such servants ;

(*c*) disburse the salaries of all such servants ; and

(*d*) deal with applications from such servants for leave of absence :

Provided that no person shall be appointed under this section who has been dismissed for misconduct from employment under any other cantonment or local authority, or any Department of the Government.

Punishment of servants of cantonment authority.

21. The Cantonment Magistrate may, for reasons to be recorded by him in writing, fine, suspend, dismiss or reduce to a lower grade or salary any servant of the cantonment authority :

Provided, first, that no fine so imposed shall exceed one week's salary of the servant fined :

Provided, secondly, that the Cantonment Magistrate shall submit to the cantonment authority a monthly list of all such fines, suspensions, dismissals and reductions : and

Provided, thirdly, that the Cantonment Magistrate shall not dismiss any servant whose salary is not less than twenty-five rupees a month, without obtaining the previous sanction of the cantonment authority.

XLV. of 1860. Penalty for obstructing in their duty persons employed by, or contracting with, the cantonment authority.

22. Whoever obstructs or molests any person employed by the cantonment authority (not being a public servant within the meaning of section 21 of the Indian Penal Code), or any person with whom the cantonment authority may have lawfully contracted, in the performance and execution of his duty or of anything which he is empowered or required to do by virtue or in consequence of any of the provisions of this Code, shall be punishable with imprisonment for a term which may extend to eight days, or with fine which may extend to fifty rupees.

Notice of discharge or resignation.

23. (1) In the absence of a written contract to the contrary, every sweeper employed by the cantonment authority shall be entitled to one month's notice before discharge or to one month's wages in lieu thereof, unless he is discharged for misconduct or was engaged for a specified term and discharged at the end of it.

(2) Whoever, being a sweeper employed by the cantonment authority, in the absence of a written contract authorizing him so to do and without reasonable cause, resigns his employment or absents himself from his duties without giving one month's notice to the cantonment authority, or neglects or refuses to perform his duties or any of them, shall be punishable with imprisonment for a term which may extend to two months.

(3) The Local Government may, by notification, direct that, on and from a date to be specified in the notification, the provisions of this section with respect

to sweepers shall apply also to any specified class of servants employed by the cantonment authority whose functions intimately concern the public health or safety.

Security to be furnished by certain servants of cantonment authority.

24. (1) The Cantonment Magistrate shall require every servant of the cantonment authority who is entrusted with the receipt, custody or control of moneys or securities for money, to furnish security for the due discharge of his office to such amount as the cantonment authority may determine.

(2) No security shall be accepted other than a deposit of—

(*a*) cash, or

(*b*) Government securities, or

(*c*) shares in the Bank of Bengal, the Bank of Madras or the Bank of Bombay, or

(*d*) debentures or other securities for money issued by or on behalf of a local authority.

Annual report as to sufficiency of security furnished.

25. On or about the first day of January in each year the Cantonment Magistrate shall submit to the cantonment authority a report as to the sufficiency of the security furnished by or on behalf of its servants.

Procedure in dealing with moneys and securities deposited.

26. The Cantonment Magistrate shall deal in the manner prescribed in the Civil Account Code with all moneys and securities deposited as security by or on behalf of servants of the cantonment authority or persons who have entered into contracts with the cantonment authority :

Provided that no such moneys or securities as aforesaid shall be delivered up,—

(*a*) if deposited by or on behalf of a servant of the cantonment authority, until after the lapse of such time after the death of, or the vacation of his office by, such servant as the cantonment authority may direct ; or,

(*b*) if deposited by or on behalf of a contractor, then, in the absence of any condition in the contract to the contrary, until after the lapse of such time after the completion of the contract to the satisfaction of the cantonment authority as that authority may direct.

CHAPTER IV.

CANTONMENT FUND.

Credits to Fund.

Sums to be credited to cantonment fund.

27. There shall be placed to the credit of the cantonment fund the following sums, namely :

(*a*) all sums directed by section 21, sub-section (1), of the Cantonments Act, 1889, or by or under any other enactment for the time being in force, to be placed to the credit of that fund : and XIII. of 1899.

(*b*) all grants-in-aid and other sums received by the cantonment authority in aid of that fund.

Grants-in-aid.

28. (1) The Secretary to the Government of India in the Military Department shall, from time to time, intimate to the General Officer of the Command the annual sum (if any) which will from time to time be placed at his disposal by the Government of India as a grant-in-aid to the cantonment funds in his Command.

(2) The General Officer of the Command shall distribute the said sum among the said cantonment funds in such proportions as he may think fit.

Application of Fund.

Purposes to which cantonment fund may be applied.

29. (1) The cantonment fund may be applied to the following purposes within the cantonment, namely :

(*a*) the payment of any expenses directed by or under any enactment for the time being in force to be debited to the fund ;

(*b*) the maintenance of the police-force employed in the cantonment, including charges of every description required for the efficient discharge of the duties of that force therein ;
(*c*) the provision and maintenance of an office for the cantonment authority ;
(*d*) the payment of the salaries of the cantonment establishment ;
(*e*) the survey of buildings and lands ;
(*f*) the management and improvement of lands and other property placed by the Government under the management of the cantonment authority, including—
(i) the construction and maintenance of streets (other than those maintained from Imperial or Provincial funds),
(ii) the lighting, watering and cleansing of streets, and
(iii) the maintenance of public parks and gardens and the planting and tending of trees ;
(*g*) the provision and maintenance, or the aiding, of hospitals, dispensaries and schools ;
(*h*) the provision and maintenance of public markets and slaughter-houses ;
(*j*) the carrying out of a proper system of conservancy throughout the cantonment for all its inhabitants other than classes of troops for whom conservancy is provided from public revenues other than the cantonment fund, including—
(i) the pay of the public conservancy establishment,
(ii) the construction of public latrines and other conservancy works, and
(iii) the purchase of all necessary conservancy carts, utensils and other appliances ;
(*k*) the carrying out of a proper system of water-supply and drainage and of other sanitary measures, including public vaccination and the prevention of the spread of infectious or contagious disorders, and generally the maintenance of the cantonment in a thoroughly sanitary condition ;
(*l*) the burial, burning or other lawful disposal of the corpses of paupers and unknown persons ;
(*m*) the abatement of nuisances ;
(*n*) the taking of a census ; and
(*o*) generally the payment of all expenses incurred under this Code or any other rule or law for the time being in force.

(2) The cantonment fund may, with the general or special sanction of the Local Government, be applied to any of the purposes referred to in sub-section (1), within or without British India, beyond the limits of the cantonment, in cases in which, in the opinion of the Local Government, the application of the fund beyond those limits is for the benefit of the inhabitants of the cantonment or of any military force or detachment ordinarily quartered therein.

Estimates and Sanctions.

Money not to be paid unless expenditure sanctioned.

30. No money shall be paid from the cantonment fund unless the expenditure is either—
(*a*) provided for in the sanctioned budget estimate, or by re-appropriation under section 33, or
(*b*) sanctioned by the Local Government after consultation with the General Officer of the Command, and
(*c*) in the case of expenditure on Public Works, unless detailed estimates have been prepared and sanctioned.

Responsibility for administering funds.

31. The cantonment authority shall, under the direction of the General Officer of the Command, be responsible for administering the funds provided in the sanctioned budget estimate or sanctioned under section 30, clause (*b*).

Submission and sanctioning of budget estimates.

32. (1) On the first day of June in each year, or on such other date as the General Officer of the Command may direct, the cantonment authority shall submit to the Officer Commanding the District a budget estimate of the receipts (including any grant-in-aid) into, and expenditure from, the cantonment fund for the ensuing financial year.

(2) The budget estimate shall be framed in accordance with Form 8 in Schedule I, or in such other form as may from time to time be prescribed by the Comptroller General with the previous sanction of the Governor General in Council.

(3) The Officer Commanding the District may revise the budget estimate, and shall submit it to the General Officer of the Command.

(4) The General Officer of the Command may further revise the budget estimate, and shall submit it to the Local Government through the Accountant General by the twentieth day of November in each year.

(5) The Local Government may sanction the budget estimate, with or without modification.

(6) The sanction of the Local Government to the budget estimate shall be communicated by it to—

(*a*) the Accountant General, and

(*b*) the General Officer of the Command for intimation to the Officer Commanding the District and the cantonment authority.

Re-appropriation.

33. (1) The cantonment authority may,—

(*a*) with the previous sanction of the General Officer of the Command, re-appropriate any sum from one major head of the budget estimate to another ; or,

(*b*) with the previous sanction of the Officer Commanding the District, re-appropriate any sum from one minor head or sub-head of the budget estimate to another minor head or sub-head under the same major head :

Provided that no allotment to any major head shall, by re-appropriation, be varied by more than ten per cent. of its original amount, except with the previous sanction of the Local Government also.

(2) A copy of every order made under sub-section (1) shall be sent by the General Officer of the Command or the Officer Commanding the District, as the case may be, to the Accountant General.

Payments.

Examination of, and order for payment of, claims.

34. (1) Every claim for payment from the cantonment fund shall be supported by a voucher, duly receipted and (if necessary) stamped, and shall be presented—

(*a*) to the President of the cantonment committee ; or,

(*b*) if so directed by the General Officer of the Command, to the Secretary to the cantonment committee ; or,

(*c*) where there is no cantonment committee, to the Commanding Officer of the cantonment.

(2) The President, Seretary or Commanding Officer, as the case may be, shall check and examine every claim presented under sub-section (1), and, if it is found correct, and is supported by a voucher as aforesaid, shall sign an order for the payment thereof.

(3) If payment is to be made from the imprest, the order for payment shall be "Pay in cash rupees (in words)," and, if payment is to be made by cheque, the order shall be "Pay by cheque No. , dated , rupees (in words)," the blanks being filled up when the cheque is signed.

Payments how to be made.

35. Payment shall be made,—

(*a*) if the sum to be paid does not exceed twenty rupees, in cash ; and

(*b*) if the sum to be paid exceeds twenty rupees, by cheque.

Cheques.

36. (1) Money may be drawn from the cantonment fund only by means of a cheque written in Form 4 in Schedule I.

(2) Every cheque shall be signed as follows :—

(*a*) where there is a cantonment committee,—

(i) if the sum to be paid does not exceed one hundred rupees, by the Secretary ; or,

(ii) if the sum to be paid exceeds one hundred rupees, by the President :

(*b*) where there is no cantonment committee, by the Commanding Officer of the cantonment.

(3) Cheques drawn in favour of a Government officer shall be made payable

to order, and cheques drawn in favour of any other person shall be made payable to bearer.

(4) All cheque forms shall be bound in books with counterfoils.

(5) Every cheque book shall bear a number, and each officer authorized by sub-section (2) to sign cheques shall notify to the treasury the number of the cheque book which he from time to time brings into use.

(6) On each cheque form there shall be entered the number of the cheque book in which the form is contained, and a consecutive number.

7. There shall be noted on the outside of each cheque book an order for its personal custody under lock and key by the officer who is authorized to use the book for the purpose of signing cheques; and, when such officer is relieved, he shall take a receipt for the number of cheque forms made over to the relieving officer and shall send to the treasury a specimen of the signature of the relieving officer.

(8) No cheque shall be current for more than three months from the date on which it was drawn. After the expiration of that period payment will be refused at the treasury, and it shall be necessary for the person in whose favour the cheque was drawn, to return it. In the event of a cheque being so returned, no fresh cheque will be issued, but the lapsed cheque shall be re-dated, and the alteration initialled, by the officer whose duty it would be, under sub-section (2), to sign the cheque, a note of the fact of re-dating being entered in the register of payments against the original transaction.

Imprest.

37. (1) The cantonment authority shall, where it has not already done so, draw from the treasury a sum not exceeding fifty rupees, to form an imprest for the purpose of meeting petty payments.

(2) The amount of petty payments met out of the imprest shall be recouped by cheque on the last day of each month, and, if necessary, during the month also, so that the full amount of the imprest, plus any sum received too late for remittance to the treasury on the last day of the month, shall always be shown in the monthly accounts as being in the hands of the cantonment authority.

Overdrafts.

38. Overdrafts on the cantonment fund shall be allowed only if sanctioned by the General Officer of the Command and also by the Local Government.

Receipts.

Register of receipts and form of acknowledgment.

39. (1) All moneys received for credit to the cantonment fund shall be entered in a register of receipts, to be kept in Form 1 in Schedule I, and, with the exception of grants-in-aid and fines, shall be acknowledged by receipts in Form 2 in the said schedule.

(2) All receipts granted by way of acknowledgment under sub-section (1) shall bear printed numbers in a consecutive series, and the number of every receipt so granted shall be entered in the second column of the register of receipts.

Responsibility of cantonment authority as to receipts.

40. The cantonment authority shall be responsible for making such arrangements as will secure—

(*a*) that all moneys received for credit to the cantonment fund are duly brought to credit in the accounts;

(*b*) that all moneys so received, with the exception of grants-in-aid and fines, are duly acknowledged by receipts in the form prescribed by section 39; and

(*c*) that, whenever a receipt is given, the foil and counterfoil are duly filled up.

Account of the Imprest.

Imprest register.

41. An account of the imprest shall be kept in an imprest register in Form 6 in Schedule I, and the expenditure recorded in it shall be entered in a register of payments, to be kept in Form 5 in the said schedule, when a bill for the recoupment of the amount is made out and the amount is drawn from the treasury by cheque.

Bills for Expenditure.

42. (1) Every item of expenditure shall be entered in a bill of one of the following kinds, namely :

Expenditure to be entered in bill.

(*a*) an establishment pay bill—for the pay of members of the cantonment establishment.

(*b*) a travelling allowance bill—for the travelling allowances of members of the cantonment establishment ; or

(*c*) a contingent bill—for all charges other than the pay and travelling allowances of members of the canton establishment.

(2) Every establishment pay bill and every travelling allowance bill shall be prepared in the form for the time being prescribed by the Civil Account Code.

(3) Every contingent bill shall contain full details of the charges incurred.

43. (1) Claims for supplies or services by contractors or tradesmen shall be paid on bills presented by them.

Claims by contractors or tradesmen.

(2) Where any such claim as aforesaid is paid by cheque, the payment shall be at once entered in the register of payments, and, where it is paid in cash, the payment shall be entered in the imprest register.

(3) Where a contractor or tradesman presents his bill in the vernacular, a brief abstract shall be indorsed thereon in English, stating the amount, the name of the payee and the nature of payment in the terms prescribed by Article 9 (*b*) of the Civil Account Code.

44. (1) All petty charges to be met from the imprest shall be entered in bills prepared in the form for the time prescribed by the Civil Account Code.

Petty charges to be met from the imprest.

(2) Such bills as aforesaid shall be supported,—

(*a*) in the case of a payment for a telegram or of any other sum exceeding ten rupees, by the original voucher on which the payment was actually made ; and,

(*b*) in other cases, by a certificate that the receipts of the payees have, as far as possible, been obtained, and have been so destroyed, defaced or mutilated that they cannot be used again.

(3) The certificate referred to in clause (*b*) of sub-section (2) shall be signed by the Secretary to the cantonment committee, or, if there is no cantonment committee, by the Commanding Officer of the cantonment.

45. (1) All charges incurred direct by the cantonment authority and paid by cheque shall be entered in bills prepared in the form for the time prescribed by the Civil Account Code.

Charges incurred direct by cantonment authority.

(2) The following certificate shall be recorded at the foot of every such bill and signed by the Secretary to the cantonment committee or, if there is no cantonment committee, by the Commanding Officer of the cantonment, namely :—

"I certify that the expenditure charged in this bill could not, with due regard to the interests of the cantonment, be avoided. I have satisfied myself that the charges entered in this bill have really been paid."

(3) In the case of expenditure on Public Works, the usual completion certificate shall be furnished.

Entry of Cheques in Accounts.

46. All payments made by cheque shall be entered in the register of payments, the vouchers being numbered in a monthly consecutive series.

Entry of payments by cheque.

47. Where a cheque is cancelled, the amount thereof shall be deducted from the expenditure by a minus entry in the appropriate column of the register of payments. The deduction shall then pass into the cash book through the daily total of payments carried into it.

Deduction of amount of cancelled cheques.

48. The cantonment authority shall keep a cash book in Form 7 in Schedule I. The cash book shall be balanced monthly, and the balance shown in it reconciled with that shown in the pass book, to be kept in Form 3 in the said schedule, as follows :—

Cash book.

Balance as per pass book ... ...
Add—
Amount of imprest ... ...
Money received too late for remittance to treasury ...

Total ... ...

Deduct—Outstanding cheques, as per details below :—
Balance as per cash book ... ...

Cheques outstanding on—

No.	Date.	Amount.
,,	,,	,,

Total ... ...

49. (1) In the registers of receipts and payments the amounts sanctioned in the budget estimate for the year shall be entered at the top of the columns for the heads for which separate estimates are made.

Entry of budget estimate in registers of receipts and payments.

(2) Where, during the year or in any revised estimate which may be sanctioned for the year, any addition to or alteration in the budget estimate is made, such addition or alteration shall be noted in the appropriate register in red ink, with a plus or minus sign, the order therefore being cited.

50. (1) At the end of each month the figures in the registers of receipts and payments shall be added up, the totals up to the end of the last preceding month being added to those of the month just expired and grand totals being made from the first day of April last preceding.

Totals of receipts and payments to be ascertained monthly.

(2) Where the grand total under any head in the register of payments shows that the budget grant is likely to be exceeded, application shall at once be made for orders under section 30, clause (*b*), or section 33, as the circumstances may require, to cover the excess.

51. As soon as possible within ten days after the end of each month, the cantonment authority shall send to the Accountant General, for purposes of audit,—

Documents to be sent to Accountant General.

(*a*) extracts from the registers of receipts and payments for the month, prepared in the same detail as those registers and showing the budget estimate, each receipt and payment, the monthly totals, the totals to the end of the last preceding month and the grand totals ;
(*b*) the foils of all receipts granted during the month ;
(*c*) all paid bills ;
(*d*) any cancelled cheques ; and
(*e*) a statement of the balances, in the following form :—
Balance at the end of last month ... ...
Receipts during the month, as per details below ...

Total ... ...

Expenditure during the month, as per accompanying schedule ... ...

BALANCE AT THE END OF THE MONTH.

Details of balance—

Balance in treasury, as per pass book ... ...
Cash received too late for remittance to treasury ...
Imprest in hands of cantonment authority ... ...

Deduct—Outstanding cheques, as per details below :

Net balance as above ... ...

Cheques outstanding on—

No.	Date.	Amount.
"	"	"
	Total	

52. (1) The cantonment authority shall prepare annually a consolidated account showing the receipts into, and payments from, the cantonment fund, classified under the major heads, minor heads and sub-heads contained in the monthly accounts.

Annual consolidated account.

(2) The total of the details under each head of receipts and payments, as given in the consolidated account, shall agree exactly with the figures appearing against the entry " From 1st April to date " under the same heads in the extracts forwarded to the Accountant General for the month of March last preceding.

(3.) The consolidated account shall be forwarded to the Accountant General, who will compare the figures with his own classified abstract and, if correct, forward the account to the General Officer of the Command with the following indorsement, namely :

" Examined and found correct.

*Signed*_____, Accountant General."

Classification.

53. (1) All receipts into, and expenditure from, the cantonment fund shall be classified, in the monthly and annnal accounts, in accordance with Form 8 in Schedule I.

Classification of receipts and expenditure.

(2) All expenditure shall be classified in the monthly accounts under the appropriate major heads, minor heads and sub-heads with reference to the nature of the charge, whether specific budget provision exists or not ; and no expenditure, which from its nature properly falls under one of the other prescribed heads, shall be classified under the head " Miscellaneous " on the ground that there is no specific budget provision for the charge.

Explanation.—Every permanent advance to a cantonment fund receiving a grant-in-aid under section 28 shall be held outstanding in the military accounts until the fund becomes self-supporting, and the advance shall then merely be shown as a balance in the hands of the cantonment authority.

Remittance to Treasury and Pass Book.

54. The cantonment authority shall remit to the treasury all moneys received for credit to the cantonment fund.

All moneys to be remitted to treasury.

55. (1) Remittances to the treasury may be made either daily or weekly, as may be most convenient :

Procedure for remittances to treasury.

Provided that all moneys in hand on the last working day of each month hall be remitted on that day.

(2) Every remittance shall be accompanied by a chalan or invoice and by he pass-book.

(3) Where a remittance is made, the officer in charge of the treasury shall forthwith acknowledge its receipt by an entry in the pass-book, and shall enter on the charge side of the pass-book particulars of cheques paid up to date as recorded in his register.

(4) The pass-book shall be sent to the treasury on the last working day of each month, whether or not there are any moneys to be remitted to the treasury on that day. The officer in charge of the treasury shall then close the pass-book for the month, and enter therein in words the belance in hand, signing the entry.

Supervision of pass-book by cantonment authority.

56. (1) The cantonment authority shall from time to time examine the pass-book and shall forthwith call the attention of the officer in charge of the treasury to any discrepancy appearing between the credits or debits shown therein and those shown in its registers.

(2) The pass-book shall be written up only by the officer in charge of the treasury or by some member of his establishment, and no entries or marks shall be made therein by the cantonment authority or by any member of the cantonment establishment.

Abstract Statement of Estimated Income and Expenditure.

Abstract statement of estimated income and expenditure.

57. The General Officer of the Command shall, on receiving the sanction of the Local Government to the budget estimate for the several cantonment funds in his Command, forward to the Government of India in the Military Department, to the Commander-in-Chief in India and to the Local Government for information, an abstract statement of the estimated income of, and expenditure from, all such funds.

Submission of proposals as to taxation.

Submission of proposals as to taxation.

58. All proposals made by the cantonment authority for the imposition, abolition or modification of any tax shall be submitted to the General Officer of the Command for transmission to the Local Government.

CHAPTER V.

CONTRACTS.

Contracts by whom to be executed.

33 & 34 Vict. c. 59.

59. Every contract made by the cantonment authority shall be executed on its behalf by the officer authorized by the Governor General in Council so to execute it under section 2 of the East India Contracts Act, 1870.

Sanction required to execution of contract to remain in operation for more than twelve months.

60. No lease or other contract, which is to remain in operation for more than twelve months, shall be executed on behalf of the cantonment authority without the previous sanction of the General Officer of the Command:

Provided that, where any such lease as aforesaid is a lease of land, the sanction of the General Officer of the Command shall not be given without the concurrence of the Local Government.

Reference to Executive Engineer prior to execution of contracts for works.

61. No contract for the execution of a work shall be executed on behalf of the cantonment authoritity unless it has been examined and approved of by the Executive Engineer:

Provided that, where a work is estimated to cost not more than five hundred rupees, the contract shall not be referred to the Executive Engineer unless the cantonment authority so directs.

Sanction of cantonment committee or Officer Commanding cantonment required to execution of contracts exceeding one hundred rupees in value.

62. The officer authorized as provided by section 59 shall not execute on behalf of the cantonment authority any contract the value or amount of which exceeds one hundred rupees, without the previous sanction of—

(*a*) the cantonment committee ; or,

(*b*) where a cantonment committee has not been constituted or has ceased to exist or cannot be convened, the Commanding Officer of the cantonment :

Provided that, in case of urgency where there is a cantonment committee, the officer authorized as aforesaid may, with the previous sanction of the President of the cantonment committee, execute on behalf of the cantonment committee any contract the value or amount of which exceeds one hundred rupees but does not exceed two hundred rupees, and shall, in every such case, submit to the cantonment committee, at its next meeting, a report of his action and of the reasons therefor.

Form of contracts exceeding fifty rupees in value.

63. Every contract executed on behalf of the cantonment authority the value or amount of which exceeds fifty rupees, except a contract for the sale of moveable property, shall be in writing ; and, if the contract is for the execution of a work, it shall be prepared in the form in use for that purpose in the Public Works Department under the orders of the Local Government.

Security for fulfilment of contract.

64. (1) The cantonment authority may direct that security be required for the fulfilment of any contract to be executed on its behalf, other than a contract for the execution of a work, and that the whole or any part of the security be deposited before the contract is executed.

(2) Where any security is required under sub-section (1), it shall be of the nature specified in section 24, sub-section (2) and shall be of such amount as the cantonment authority may think fit.

(3) Where any security required as aforesaid has been given, the contract shall not be executed unless—

(*a*) it contains a clause specifying the nature and the amount of the security required ; and

(*b*) any sum directed to be deposited has been lodged with the cantonment authority.

Saving of leases for building-sites.

65. Nothing in this Chapter shall apply to any lease of land for the purposes of a building-site.

CHAPTER VI.

NUISANCES AND SANITATION.

Nuisances.

Offences in road or public place.

66. Whoever,—

(*a*) in any street or public place within the cantonment,—

(i) is drunk and disorderly, or drunk and incapable of taking care of himself ; or

(ii) uses any threatening, abusive or insulting words, or behaves in a threatening or insulting manner, with intent to provoke a breach of the peace, or whereby a breach of the peace is likely to be occasioned ; or

(iii) eases himself, or wilfully and indecently exposes his person ; or

(iv) begs importunately for alms ; or

(v) exposes or exhibits, with the object of exciting charity, any deformity or disease or any offensive sore or wound ; or

(vi) carries meat exposed to public view ; or

(vii) is found gaming ; or

(viii) pickets animals or collects carts ; or,

(ix) being engaged in the removal of night-soil or other offensive matter or rubbish, neglects to sweep away or otherwise effectually remove any portion thereof that may spill or fall on to such street or public place ; or,

(x) without proper authority, affixes or causes to be affixed any bill, notice or other document upon any building, monument, post, wall, fence, tree or other thing ; or,

(xi) without proper authority, defaces, or writes upon, or otherwise marks, any building, monument, post, wall, fence, tree or other thing or,

(xii) without proper authority, removes, destroys, defaces or otherwise obliterates any notice or other document put up or exhibited under this Code ; or,

(xiii) without proper authority, breaks, throws down or damages any direction-post, lamp, lamp-post or other thing maintained by the cantonment authority in such street or public place ; or,

(xiv) carries a corpse, or causes the same to be carried, without keeping it decently covered, or without taking due precaution to prevent risk of infection or injury to the public health, or annoyance to passers-by or to persons dwelling in the neighbourhood ; or

(*b*) carries a corpse along a route prohibited by the cantonment authority by public notice ; or

(*c*) deposits, or permits his servant to deposit, any offensive matter or rubbish in any place not intended for the purpose on any street or public place, or waste or unoccupied land under the management of the cantonment authority ; or,

(*d*) having charge of a corpse, fails to bury, burn or otherwise lawfully dispose of the same within twenty-four hours after death ; or

(*e*) makes any grave, or buries or burns any corpse, at an unauthorised place ; or

(*f*) having entered or used a public conveyance under the circumstances or for any of the purposes mentioned respectively in section 184, fails to disinfect the same to the satisfaction of the cantonment authority ; or

(*g*) keeps or uses, or knowingly permits to be kept or used, any place as a common gaming-house, or assists in conducting the business of any common gaming-house ; or

(*h*) wilfully intrudes upon a place set apart for bathing purposes and incommodes persons lawfully using the same ; or,

(*i*) at any time or place prohibited by the cantonment authority by general or special notice, beats a drum or tom-tom, blows a horn or trumpet, or beats or sounds any brass or other instrument or utensil, or plays any music ; or,

(*j*) by singing, screaming or shouting, disturbs the public peace or order ; or

(*k*) fires a gun, or does any other act, in such manner as to frighten or be likely to frighten animals passing by, or to cause or be likely to cause annoyance or danger to persons passing by or dwelling or working in the neighbourhood ; or

(*l*) lets loose any horse or other animal so as to cause, or negligently allows any horse or other animal to cause injury, danger, alarm or annoyance to any person ; or

(*m*) suffers any ferocious dog to be at large without a muzzle ; or

(*n*) sets on or urges any dog or other animal to attack, worry or put in fear any person ; or,

(*o*) being the occupier of any building or land in or upon which an animal dies, neglects, within three hours after the death of the animal or, if the death occurs at night, within three hours after sunrise, either—

to report the death to the Cantonment Magistrate or to some officer (if any) appointed by him to receive such reports, with a view to the removal and disposal of the carcass by the public conservancy establishments, or

to remove and dispose of the carcass in accordance with any general directions given by the cantonment authority by notice, or any special directions given by the Cantonment Magistrate on receipt of such report as aforesaid ; or,

(*p*) except with the written permission of the cantonment authority, stores or uses night-soil, manure, rubbish or any other substance emitting an offensive smell ;

shall be punishable with imprisonment for a term which may extend to eight days, or with fine which may extend to fifty rupees.

Destruction of stray dogs at appointed periods.

67. The cantonment authority may, by public notice, appoint from time to time certain periods within which any dogs, without collars or other marks distinguishing them as private property, found straying in the streets or beyond the enclosures of the houses of the owners of such dogs, may be destroyed ; and such dogs may be destroyed, in accordance with such order, by such person and in such manner as the Cantonment Magistrate may direct.

Explanation.—In this section the word "house" includes a hut, shop, warehouse or building.

Sanitation.

Division of responsibility for sanitation.

68. The following officers shall, for the purposes of sanitation, have control over, and be responsible for, the sanitary condition of the parts of the cantonment hereinafter indicated, namely :

(*a*) each Commanding Officer—his regimental lines, including the regimental bazar and all latrines used by the troops and followers under his command or control :

(*b*) the Executive Engineer—all yards, works, workshops and other places used by establishments under his charge :

(*c*) the Executive Officer of the Commissariat Department—all transport lines, cattle-yards, slaughter-houses, bakeries and other places used by establishments under his charge :

(*d*) the head of any other Military Department occupying, as such, any part of the cantonment—all blocks of buildings, workshops and other places used by establishments under his charge :

(*e*) the Cantonment Magistrate—the Sadr Bazar, all roads, and all other parts of the cantonment not under the control of any officer mentioned in clause (*a*), clause (*b*), clause (*c*) or clause (*d*).

Weekly sanitary report.

69. (1) Every officer mentioned in section 68 shall forward to the cantonment authority a weekly sanitary report, stating that the parts of the cantonment over which he has control as aforesaid have been inspected by him, and are, in his opinion, in a sanitary condition or otherwise, as the case may be.

(2) Where any such officer as aforesaid reports that any part of the cantonment under his control is not, in his opinion, in a sanitary condition, he shall specify the defects and may make such suggestions for remedying the same as he may think fit.

General duties of Sanitary Officer.

70. The Sanitary Officer shall exercise a general sanitary supervision over the whole cantonment, shall report every insanitary practice and every insanitary condition of things, whenever or wherever existing therein, both to the officer responsible under section 68 and to the cantonment authority, and shall attach to his report such recommendations for the remedy of the same as he may think fit.

Cantonment Magistrate's duties in respect of sanitation.

71. The Cantonment Magistrate shall, subject to the other provisions of this Code and the control of the cantonment authority,—

(*a*) make, and supervise the carrying out of, all arrangements (including the provision and maintenance of a sufficient number of animals, vehicles, receptacles and implements, and of places for keeping the same) necessary for—

(i) the removal of night-soil and other offensive matter and rubbish

from latrines, urinals, streets and all other places, public and private, from which the removal of the same by the public conservancy establishments is directed by the cantonment authority ;

(ii) the surface cleansing of all streets and the watering thereof ; and

(iii) the maintenance in a sanitary condition of public and private latrines and urinals, of encamping grounds and sarais, of public and private markets and slaughter-houses, of fair-grounds, of all sources of public water-supply and the lands in the vicinity thereof, of all other places likely to create a nuisance, and, generally, of every part of the cantonment other than the parts mentioned in clauses (*a*) to (*d*) of section 68 ;

(*b*) make frequent inspections of all parts of the cantonment with a view to ensuring that all orders of the cantonment authority on sanitary matters are duly obeyed, and that the public conservancy establishments satisfactorily perform their duties ; and,

(*c*) take all necessary steps for remedying any defects in the sanitary condition of the cantonment of which he may become aware and for which funds can be provided.

Provision and maintenance of public latrines and urinals and conservancy establishments.

72. (1) So far as the funds at its disposal permit, the cantonment authority shall provide and maintain a sufficient number of public latrines and urinals, with all necessary conservancy establishments.

(2) Such latrines and urinals shall be placed in proper and convenient situations, as near as circumstances admit to the dwelling-places or places of resort of the persons for whose use they are intended :

Provided that, except with the previous sanction of the General Officer of the Command, no latrine or urinal shall be placed within fifty feet, and no trench latrine shall be placed within two hundred feet, of any inhabited building.

(3) Separate latrines and urinals shall ordinarily be provided for males and females, or, if any latrine or urinal is provided for the use of both sexes, separate divisions shall be provided for each sex, and each such latrine, urinal or division shall be marked as being for the use of men only, or women only, as the case may be.

Directions as to provision of public latrines and establishments therefor.

73. (1) In providing public latrines the cantonment authority shall observe the following directions, namely :

(*a*) such number of latrines shall be provided as will admit of there being one compartment for the use of every fifteen adults using the latrines ;

(*b*) no latrine shall be constructed for the use of more than five hundred adults ;

(*c*) every latrine, other than a trench latrine, shall be provided with proper closed iron receptacles in the proportion of not less than two for every hundred adults using the latrine, and with not less than one iron or glazed earthen pan for each compartment ;

(*d*) for every latrine, other than a trench latrine, there shall be provided,—

(i) for the cleansing thereof, sweepers in the proportion of not less than one for every hundred adults using the latrine, and

(ii) for the removal of night-soil therefrom, air-tight iron filth-carts in the proportion of not less than one for every five hundred adults using the latrine, or, where carts cannot be used, sweepers in the proportion of not less than three for every five hundred adults using the latrine ; and

(*e*) for every trench latrine, there shall be provided digging-sweepers in the proportion of not less than one for every two hundred adults using the latrine :

Provided that, if in any case it is inpracticable, owing to want of funds or for any other sufficient reason, fully to observe the foregoing directions, the General Officer of the Command may declare the extent to which they shall be observed.

(2) No public latrine shall be constructed or rebuilt except on a plan approved of by the General Officer of the Command.

74. The cantonment authority shall, whenever necessary, provide and maintain in proper and convenient positions receptacles or places for the temporary deposit of offensive matter and rubbish.

Receptacles or places for temporary deposit of offensive matter and rubbish.

75. The cantonment authority shall appoint places for the disposal of night-soil, carcases and other offensive matter and rubbish.

Places for disposal of offensive matter and rubbish.

Cesspools, receptacles for filth, &c.

76. The cantonment authority may, by notice in writing,—

(*a*) require any person having the control, whether as owner, lessee or occupier, of any land or building,—
  (i) to close any offensive cesspool belonging to the land or building, or
  (ii) to provide a receptacle (of a pattern, if any, approved of by the cantonment authority) for filth accumulating on or in the land or building, or
  (iii) to keep in a cleanly condition (in such manner, if any, as may be prescribed by the notice), any receptacle provided for such filth, or
  (iv) to prevent the water of any private latrine, urinal, sink or bath-room, or any other offensive matter, from soaking, draining, flowing or being put from the land or building upon any street or public place or into any water-course or into any drain not intended for the purpose ; or

(*b*) require the owner or other person having the control of any private latrine or urinal not to put the same to public use ; or,

(*c*) where any plan for the construction of private latrines or urinals has been approved of by the cantonment authority and copies thereof may be obtained free of charge on application,—
  (i) require any person repairing or constructing a private latrine or urinal not to allow the same to be used until it has been inspected by or under the direction of the Cantonment Magistrate and approved of by him as conforming with that plan, or
  (ii) require any person having the control of a private latrine or urinal to rebuild or alter the same in accordance with that plan ;

(*d*) require the owner or other person having the control of any private latrine or urinal which, in the opinion of the cantonment authority, creates a nuisance, to remove the latrine or urinal, and to substitute fresh earth, to such a depth, not exceeding two feet, as may be specified in the notice, for the earth on which the latrine or urinal stood ; or

(*e*) require any person having the control, whether as owner, lessee or occupier, of any land or building,—
  (i) to have any latrine provided for the same shut out by a sufficient roof and wall or fence from the view of persons passing by or dwelling or working in the neighbourhood, or
  (ii) to cleanse with deodorants any latrine or urinal belonging to the land or building ; or

(*f*) require any person who has the control, whether as owner, lessee or occupier, of any land or building, and has allowed any offensive matter or rubbish to accumulate or remain thereon or therein, to collect the same and deposit it, for removal by the public conservancy establishment, at such times and in such receptacles or places, situate at not more than one hundred feet from the nearest boundary of the premises, as may be specified in the notice ; or

(*g*) where any land or building is situate within one hundred feet of a public drain or other place set apart for the discharge of drainage and the drains belonging to the land or building are, in the opinion of the cantonment authority, insufficient, require any person having control of the land or building, whether as owner or lessee, or, in the case of neighbouring lands or buildings, the several lessees or owners having control of the lands or buildings conjointly, to provide sufficient drainage within fifteen days from the service of the notice ; or

(*h*) require any person to desist from making or altering any drain leading into a public drain ; or

(*i*) require any person who is creating or likely to create a nuisance by—

(i) altering, obstructing or encroaching upon a public drain, or

(ii) impeding the flow of water owing to the absence of a culvert or the existence of an insufficient culvert under a path leading to his premises,

to desist therefrom ; or

(*j*) require any person who is constructing or laying a drain, to obey any directions which the cantonment authority may, on the advice of the Executive Engineer, think fit to give in order to ensure the completion of the work to its satisfaction ; or

(*k*) require any person, being the owner and having the control of any drain, to provide and apply to the same, within ten days from the service of the notice, such covering as may be specified in the notice ; or

(*l*) require any person having the control of a drain to remove, within a period to be specified in the notice, any obstruction from the same, or to cleanse, purify, repair or alter the same or otherwise put it in good order.

Provision of latrines, etc.

77. (1) The cantonment authority may, by notice in writing, require the owner or lessee of any building or land, in such manner as may be specified in the notice, to remove or provide any latrine, urinal, cesspool or other receptacle for filth, or to provide any additional latrines, urinals, cesspools or other receptacles as aforesaid which should in its opinion be provided for the building or land.

(2) The cantonment authority may, by notice in writing, require any person employing more than twenty workmen or labourers to provide such latrines and urinals as it may think fit, and to cause the same to be kept in proper order and to be daily cleansed.

Employment of public sweepers.

78. (1) The cantonment authority may provide for the performance by its agents of the duties usually performed by sweepers in respect of any building or land, or of any latrine, urinal, cesspool or other receptacle for filth pertaining to any building or land, with the consent of the occupier of the building or land, or without such consent where the occupier fails to make arrangements to the satisfaction of the cantonment authority for the performance of such duties.

(2) Where the cantonment authority has provided for the performance by its agents of the duties referred to in this section, all matter removed by such agents in performing such duties shall be at the disposal of that authority.

Removal of noxious vegetation.

79. The cantonment authority may, by notice in writing, require the owner, lessee or occupier of any land to clear away and remove any thick or noxious vegetation or undergrowth which appears to it to be injurious to health or offensive to the neighbourhood.

Filling up of tank or marshy ground or draining off or removal of stagnant water.

80. Where any tank, marshy ground or waste or stagnant water, whether within any private enclosure or not, is in such a condition as to create a nuisance, the cantonment authority may, by notice in writing, require the owner, lessee or occupier of the land, within thirty days from the service of the notice, to fill up the tank or ground, or to drain off or remove the water, as the case may be :

Provided that, if, in the opinion of the cantonment authority, it is unreasonable to throw the whole expense on the owner, lessee or occupier, it may, with the previous sanction of the General Officer of the Command, require him to pay only a proportion of the expense.

Removal of overcrowded buildings.

81. (1) Where it appears to the cantonment authority that any block of buildings is, by reason of the manner in which the buildings are crowded together, in an unhealthy condition, it may cause the block to be inspected by a special committee consisting of—

(*a*) the Sanitary Officer,

(*b*) the Civil Surgeon of the district, or, if his services are not available, some other medical officer of the Government, and

(*c*) the Executive Engineer, or some person deputed by the Executive Engineer in this behalf.

(2) The special committee shall make a report in writing to the cantonment authority on the sanitary condition of the block; and, if it considers that the overcrowded condition thereof is likely to cause risk of disease to the inhabitants of the buildings or of the neighbourhood, or to endanger the public health, it shall clearly indicate, on a plan verified by the Executive Engineer or by the person deputed by him to serve on it, the buildings which should, wholly or in part, be removed in order to abate the unhealthy condition of the block.

(3) If, upon receipt of such report, the cantonment authority is of opinion that all or any of the buildings indicated should be removed, it may, by notice in writing, require the owners thereof to remove them:

Provided, first, that the cantonment authority shall make compensation to such owners for any buildings which may have been erected under proper authority: and

Provided, secondly, that the cantonment authority may, if it appears to it to be equitable under the circumstances to do so, pay to such owners such sum as it may think fit as compensation for any buildings which may not have been erected under proper authority.

(4) The sum payable as compensation under the first proviso to sub-section (3) may be settled by mutual agreement between the cantonment authority and such owners as aforesaid, or, in default of agreement, by a committee of arbitration constituted as provided in Chapter XX.

Explanation.—In this section, the word "buildings" includes enclosure-walls or fences connected with buildings.

Reduction of number of inmates of overcrowded dwelling.

82. Where it appears to the cantonment authority that any building used as a dwelling is so overcrowded as to endanger the health of the inmates thereof, it may, after such inquiry as it thinks fit, by notice in writing, require the owner or occupier, within a time to be specified in the notice, to abate the overcrowding of the building by reducing the number of lodgers, tenants or other inmates.

Power to require that building be repaired or altered so as to remove sanitary defects.

83. (1) Where any building is so ill-constructed or dilapidated as to be, in the opinion of the cantonment authority, in an insanitary state, the cantonment authority may, by notice in writing, require the owner, within a time to be specified in the notice, to execute such repairs, or to make such alterations, as it may think necessary in order to remove such defects.

(2) A copy of every notice issued under sub-section (1) shall be conspicuously posted on the building to which the notice relates.

Explanation.—A notice issued under sub-section (1) shall be deemed to have been complied with if the owner of the building to which it relates, has, instead of executing the repairs or making the alterations directed by the notice, removed the building.

Power to require land or building to be cleansed.

84. The cantonment authority may, by notice in writing, require the owner, lessee or occupier of any building or land which appears to it to be in a filthy or unwholesome state, within twenty-four hours to cleanse the same or otherwise put it in a proper state in such manner as may be specified in the notice.

Penalties.

85. Whoever fails to comply with a notice issued under any of the provisions of sections 76 to 84, shall be punishable with fine which may extend to fifty rupees, and, in the case of a continuing failure, with an additional fine not exceeding five rupees for every day after the first in regard to which he is convicted of having persisted in the failure.

CHAPTER VII.

CONTROL OVER STREETS, BUILDINGS, LANDS, TREES, ETC.

Streets and Buildings.

Power to attach brackets for lamps.

86. The cantonment authority may attach to the outside of any building brackets for lamps in such manner as not to occasion any injury thereto or inconvenience.

Names of streets and numbers of buildings.

87. (1) The cantonment authority may cause a name to be given to any street, and to be affixed on any building in such place as it may think fit, and may also cause a number to be affixed to any building ; and may, from time to time, cause such names and numbers to be altered.

(2) Whoever destroys, pulls down or defaces any such name or number, or puts up any name or number differing from that put up by order of the cantonment authority, shall be punishable with fine which may extend to twenty rupees.

Roofs and external walls not to be made of inflammable materials.

88. The cantonment authority may, by public notice, direct that within certain limits, to be fixed by the notice, the roofs and external walls of huts or other buildings shall not, without its permission in writing, be made or renewed of grass, mats, leaves or other highly inflammable materials, and may, by notice in writing, require any person, who has disobeyed any such direction as aforesaid, to remove or alter the roofs or walls so made or renewed, as it may think fit.

Notice of new buildings.

89. (1) Whoever, except in such a case as is provided for by Chapter XXI, intends to erect or re-erect any building shall give notice in writing, in the manner hereinafter prescribed, of his intention to the cantonment authority, and the cantonment authority may, within six weeks after the receipt of the notice, refuse to sanction the building, or may sanction it either absolutely or subject to such directions as it may think fit to issue in writing in respect of all or any of the following matters, namely :

(*a*) the free passage or way to be left in front of the building ;

(*b*) the space to be left about the building to secure free circulation of air and facilitate scavenging and the prevention of fire ;

(*c*) the ventilation of the building ;

(*d*) the provision and position of latrines, urinals, cesspools or other receptacles for filth ;

(*e*) the level and width of the foundation, the level of the lowest floor and the stability of the structure ; and

(*f*) the line of frontage with neighbouring buildings, if the building abuts on a street :

and the person erecting or re-erecting the building shall obey all such written directions :

Provided that the cantonment authority shall make full compensation to the owner for any damage which he may sustain in consequence of its prohibition of the re-erection of any building, or of its requiring any land belonging to him to be added to the street.

(2) Whoever gives notice to the cantonment authority under sub-section (1), shall, along with the notice, forward a plan and specification of the building which he intends to erect or re-erect, together with a site-plan of the land of such character and with such details as the cantonment authority may require ; and no such notice shall be valid until such plans and specification have been supplied.

(3) Where any building is begun or erected without the giving of the notice and the submission of the plans and specification required by this section, or in contravention of any order of the cantonment authority issued within six weeks of the receipt of a valid notice thereunder, the cantonment authority may, by notice in writing, to be delivered within a reasonable time, require the building to be altered or demolished, as it may think necessary.

(4) Where the cantonment authority neglects or omits for six weeks after the receipt of a valid notice under this section to make and deliver to the person who has given the notice, any order in respect thereof, it shall be deemed to have sanctioned the proposed building absolutely.

(5) Every sanction for the erection or re-erection of a building given or deemed to have been given by the cantonment authority as aforesaid shall be available for one year from the date on which the notice became valid and complete, and no longer ; and, if the building so sanctioned is not begun by the person who has obtained the sanction, or some one lawfully claiming under him, within that period, it shall not thereafter be begun without fresh sanction ; but such person as aforesaid may at any subsequent time give fresh notice to the cantonment authority in the manner hereinbefore prescribed, and thereupon the provisions hereinbefore contained shall apply to the fresh notice.

Explanation.—In this section the expression " erect or re-erect any building " includes—

(*a*) any material alteration or enlargement of any building ;

(*b*) the conversion into a place for human habitation of any building not originally constructed for human habitation ;

(*c*) the conversion into more than one place for human habitation of a building originally constructed as one such place ;

(*d*) the conversion of two or more places of human habitation into a greater number of such places ;

(*e*) such alterations of the internal arrangement of a building as affect an alteration of its drainage or sanitary arrangements, or affect its security ; and

(*f*) the addition of any rooms, buildings, out-houses or other structures to any building.

Projections and obstructions.

90. (1) The owner or occupier of a building shall not, without the permission in writing of the cantonment authority, add to, or place against or in front of, the building, any projection or structure overhanging, projecting into, or encroaching on, any street, or into or on any drain, sewer or aqueduct therein.

(2) The cantonment authority may, by notice in writing, require the owner or occupier of any building to alter or remove any such projection or encroachment as aforesaid ;

Provided that, in the case of any projection or encroachment lawfully in existence at the commencement of this Code, the cantonment authority shall make reasonable compensation for any damage caused by the removal or alteration.

(3) The cantonment authority may, by order in writing, give permission to the owners or occupiers of buildings in any particular street to put up open verandahs, balconies or rooms projecting from any upper storey thereof to an extent beyond the line of the plinth or basement-wall, and at a height from the level of the ground or street, to be specified in the order.

Troughs and pipes for rain-water.

91. The cantonment authority may, by notice in writing, require the owner or lessee of any building or land in any street to put up and keep in good condition proper troughs and pipes for receiving and carrying the water from the building or land and for discharging the same so as not to inconvenience persons passing along the street.

Unauthorized buildings over drains, etc.

92. The cantonment authority may, by notice in writing, require any person who has, without its permission in writing, newly erected or re-erected any building over any public sewer, drain, culvert, water-course or water-pipe, to pull down or otherwise deal with the same as it may think fit.

Power to require buildings, wells, tanks, etc., to be secured.

93. Where any building, well, tank, reservoir, pool, depression or excavation is, in the opinion of the cantonment authority, for want of sufficient repair, protection, or enclosure, as the case may be, dangerous to persons passing by or dwelling or working in the neighbourhood, the cantonment authority may, by notice in writing, require the owner or occupier thereof to repair, protect

or enclose the same ; and, if there is, in the opinion of the cantonment authority, imminent danger, it shall forthwith take such steps to avert the danger as it may think necessary.

Buildings, etc., in ruinous or dangerous state.

94. Where any building, wall or structure, or anything affixed thereto, or any bank or tree, is, in the opinion of the cantonment authority, in a ruinous state or in any way dangerous, the cantonment authority may, by notice in writing, require the owner or occupier thereof forthwith either to remove the same or to cause such repairs to be made as it may think necessary for the public safety, and, if there is, in the opinion of the cantonment authority, imminent danger, it shall forthwith take such steps to avert the danger as it may think necessary.

Power to require untenanted building or land becoming a nuisance to be secured or enclosed.

95. The cantonment authority may, by notice in writing, require the owner or part-owner, or person claiming to be the owner or part owner, of any building or land, or the lessee or person claiming to be the lessee of any land, which, by reason of abandonment or disputed ownership or other cause, has remained untenanted and become a resort of idle and disorderly persons or otherwise a nuisance, to secure or enclose the same within a time to be specified in the notice.

Boundaries, Trees, etc.

Boundary-walls, hedges and fences.

96. (1) The cantonment authority may, by public notice, prohibit the construction of boundary-walls, hedges or other fences of any material or description which is, in its opinion, unsuitable, unsightly or otherwise objectionable.

(2.) The cantonment authority may, by notice in writing, require the owner or lessee of any land—

(*a*) to remove from the land any boundary-wall, hedge or other fence which is, in its opinion, unsuitable, unsightly or otherwise objectionable ;

(*b*) to construct on the land sufficient boundary-walls, hedges or other fences of such material, description and dimensions as may be specified in the notice ;

(*c*) to maintain the boundary-walls, hedges or other fences on the land in good order.

Explanation.—In this section, the expression "boundary-walls, hedges or other fences" includes all necessary gates and the posts or pillars thereof.

Cutting or trimming of hedges.

97. The cantonment authority may, by notice in writing, require the owner, lessee or occupier of any land within three days to cut or trim any hedges on the land in such manner as may be specified in the notice.

General felling, lopping or trimming of trees.

98. No general felling of trees, and no general lopping or trimming of trees in a manner likely to cause permanent injury thereto, shall be ordered by the cantonment authority without the previous sanction of the General Officer of the Command.

Felling of trees of mature growth.

99. (1) No tree of mature growth, whether standing in any private enclosure or not, shall be felled without the previous sanction of the cantonment authority.

(2) Where, in the opinion of the cantonment authority, the felling of any tree of mature growth standing in a private enclosure is necessary for sanitary reasons, the cantonment authority may, by notice in writing, require the owner, lessee or occupier of the land to fell the tree within a time to be specified in the notice.

Power to require lopping or trimming of trees.

100. The cantonment authority may—

(*a*) cause to be lopped or trimmed any trees standing on land belonging to the Government ; or,

(*b*) by public notice, require all owners, lessees or occupiers of land, or, by notice in writing, require the owner, lessee or occupier of any land, to lop or trim, in such manner as may be specified in the notice, all or any trees standing on such land.

Agriculture and irrigation.

101. (1) Where, in the opinion of the cantonment authority, the cultivation of any description of crop, or the use of any kind of manure, or the irrigation of land in any specified manner, is for any reason undesirable, the cantonment authority may, by public notice, prohibit such cultivation, use or irrigation after a certain date to be specified in the notice :

Provided that, if, when a notice is issued under this section, any land to which it relates has been lawfully prepared for cultivation or any crop is sown therein or is standing thereon, the cantonment authority—

(*a*) may, subject to such conditions as it may think fit to impose, postpone the date from which the notice is to take effect ; or

(*b*) may, if it appears to it to be equitable under the circumstances to do so and whether or not it postpones the date from which the notice is to take effect, pay to any person interested in the land or crop such sum as it may think fit as compensation for any loss incurred by reason only of his having complied with the notice : and

(*c*) shall, if it directs that the notice is to take effect without delay, make compensation to all persons interested in the land or crop for any loss incurred by reason only of their having complied with the notice.

(2) The sum payable as compensation under clause (*c*) of the proviso to sub-section (1) may be settled by mutual agreement between the cantonment authority and such person or persons as aforesaid, or, in default of agreement, by a committee of arbitration constituted as provided in Chapter XX.

Improper use of land.

102. The cantonment authority may, by notice in writing, require the owner, lessee or occupier of any land to abstain from the improper use of the same, whether by quarrying, or by removing earth, sand, stone or gravel, or by digging a tank, well or pit.

Digging up of public grass-land.

103. Whoever, without the permission in writing of the cantonment authority, digs up the surface of any public grass-land, shall be punishable with fine which may extend to twenty rupees.

Penalties.

Penalties.

104. Whoever fails to comply with any notice issued under this Chapter, shall be punishable with fine which may extend to fifty rupees, and, in the case of a continuing failure, with an additional fine not exceeding five rupees for every day after the first in regard to which he is convicted of having persisted in the failure.

CHAPTER VIII.

CONTROL OVER SARAIS, ENCAMPING-GROUNDS, TRAFFIC, ETC.

Sarais.

Duties of keepers of sarais.

105. (1) Every keeper of a sarai shall be bound,—

(*a*) if to his knowledge any person in the sarai is ill of any infectious or contagious disorder, or has died of any such disorder, to make an immediate report of the fact to the officer in charge of the police-station within the jurisdiction of which the sarai is situated ;

(*b*) to maintain a sufficient supply of pure water for the use of persons frequenting the sarai ;

(*c*) to keep all parts of the sarai in a clean and sanitary condition ; and

(*d*) to give any information which the Cantonment Magistrate may, by notice in writing, require regarding—

(i) the boundaries of the sarai, and

(ii) any matters affecting its management and condition.

(2) Whoever fails to give the Cantonment Magistrate any information required under this section or wilfully gives him false information shall be punishable with fine which may extend to twenty rupees, and, in the case of a continuing failure, with an additional fine not exceeding five rupees for every day after the first in regard to which he is convicted of having persisted in the failure.

Power to require report as to persons using sarai.

106. (1) The Cantonment Magistrate may, by notice in writing, require any keeper of a sarai to report to him, or to any person whom he may appoint in this behalf, either orally or in writing as may be directed in the notice, the name and description, or the names and descriptions, of any person or persons who resorted to the sarai during any period, to be specified in the notice.

(2) Where a written report is required, the form in which the same is to be furnished may be specified in the notice.

(3) Whoever fails to comply with any notice issued under this section or wilfully makes a false report thereunder, shall be punishable with fine which may extend to twenty rupees, and, in case of a continuing failure, with an additional fine not exceeding five rupees for every day after the first in regard to which he is convicted of having persisted in the failure.

Power to close sarais.

107. (1) Where the keeper of a sarai commits a breach of any of the provisions of sections 105 and 106, the cantonment authority may, in addition to any punishment which may be inflicted thereunder, by notice in writing, require that the sarai be closed to the use of the public.

(2) A notice issued under sub-section (1) shall be cancelled and cease to have effect, if the keeper of the sarai satisfies the cantonment authority that no such breach as aforesaid would be likely to occur in the event of the sarai being re-opened to the use of the public.

XXII. of 1867.

Saving of Sarais Act, 1867.

108. The provisions of sections 105, 106 and 107 shall not apply to any cantonment to which the Sarais Act, 1867, for the time being extends.

Encamping-grounds, etc.

Encamping-grounds and pitching of tents.

109. (1) No place in the cantonment shall be used as an encanping-ground or for the pitchiug of tents without the permission in writing of the cantonment authority.

(2) Such permission as aforesaid may be granted subject to any conditions which the cantonment authority may think fit to impose with respect to sanitary arrangements and other matters affecting the public health, safety or convenience.

Markets and Slaughter-houses.

Sale in markets of articles unfit for human consumption.

110. No person shall in any market sell, or expose for sale, any article of food or drink for human consumption which is unfit therefor.

Hours during which markets may be kept open.

111. (1) The cantonment authority may, by public notice, limit the hours during which any market may be kept open for public use.

(2) A copy of every notice issued under sub-section (1) shall be conspicuously posted in each market to which the notice relates.

Sanitary Officer and Cantonment Magistrate to inspect markets.

112. The Sanitary Officer and the Cantonment Magistrate shall frequently inspect—

(*a*) articles of food and drink for human consumption kept for sale in markets ;

(*b*) the water-supply of markets ;

(*c*) the arrangements for the removal and disposal of offensive matter and rubbish from markets ; and

(*d*) all other arrangements for maintaining markets in a proper sanitary condition.

113. The cantonment authority may, by public notice, prohibit the sale or exposure for sale, of any animal or article, or class of animals or articles, in any public market.

Power to prohibit or restrict sales in public markets.

114. Where the owner or the person in charge of a private market applies for a license therefor, such license shall be granted free of charge by the Cantonment Magistrate on his being satisfied.

Licensing of private markets.

(*a*) that convenient passages have been provided between the shops, stalls, sheds or standings in the market ;

(*b*) that a sufficient supply of pure water is provided for the market ;

(*c*) that, in the case of a large market, one or more public latrines, at a distance of not less than fifty yards from the market, and one or more public urinals, according to requirements, are provided for the use of persons frequenting the market ; and

(*d*) that suitable arrangements are made for—

(i) keeping the market in a clean and sanitary condition and removing offensive matter and rubbish therefrom,

(ii) the proper ventilation of the buildings and structures in the market, and

(iii) the proper maintenance of the public latrines and urinals (if any) provided for the use of persons frequenting the market.

115. No private market shall, after the commencement of this Code, be opened to public use until it has been licensed.

New private markets to be licensed.

Power to require existing private markets to be licensed.

116. (1) The cantonment authority may require,—

(*a*) by notice in writing, the owner or the person in charge of any private market in existence at the commencement of this Code, or,

(*b*) by public notice, the owners or the persons in charge of any class of such markets,

to furnish, within a time specified in the notice, any information which may be needed for the purpose of determining whether a license should be required for any such market.

(2) On the expiration of such time as aforesaid, the cantonment authority shall determine, in respect of each market to which the notice relates, whether or not it is necessary to require a license.

(3) Where the cantonment authority determines that a license shall be required for any such market, and a license therefor either is not applied for or is refused, the cantonment authority may, by notice in writing, require the owner or the person in charge of the market to close the same until a license has been obtained.

Duties of owners or persons in charge of licensed markets.

117. The owner or the person in charge of a licensed market shall be bound—

(*a*) to maintain convenient passages between the shops, stalls, sheds or standings in the market ;

(*b*) to maintain a sufficient supply of pure water for the market ;

(*c*) to keep the market in a cleanly and sanitary condition and to remove all offensive matter and rubbish therefrom ; and

(*d*) to maintain in good order any public latrines or urinals which may have been provided for the use of persons frequenting the market.

Power to suspend or withdraw licenses for markets.

118. (1) Where the owner or the person in charge of a licensed market commits a breach of any of the provisions of sections 111 and 117, the cantonment authority may, in addition to any punishment which may be inflicted under this Code, by order in writing, suspend the license for any period to be specified in the order, or withdraw the license.

(2) No market for which a license has been granted under this Chapter, shall be kept open for public use while the license therefor is suspended or after the same has been withdrawn.

(3) A copy of every order made under sub-section (1) shall be conspicuously posted in the market to which the order relates.

Register of private markets.

119. The Cantonment Magistrate shall maintain a register of all private markets which have been licensed under this Chapter, showing—

(*a*) the date on which the license was issued, and,

(*b*) where the license has been suspended, the date and period of the suspension, or,

(*c*) where the license has been withdrawn, the date of the withdrawal.

Selling in private market when license suspended or withdrawn.

120. Whoever, knowing that a license granted for a private market is for the time being suspended or has been withdrawn, sells or exposes for sale therein any meat, fish, milk, fruit, vegetables or other perishable articles of food for human consumption, shall be punishable with imprisonment for a term which may extend to eight days, or with fine which may extend to fifty rupees.

Management of slaughter-houses generally.

121. Where the cantonment authority has made or approved of any arrangements for—

(*a*) passing and marking animals in a slaughter-house as being suitable for slaughter, or

(*b*) regulating the admission into a slaughter-house of persons carrying on business or trade or working for gain therein, or regulating the conduct of such persons therein,

the owner or the person in charge of the slaughter-house shall not slaughter, or permit to be slaughtered, any animal therein, unless those arrangements are duly observed.

Hours during which slaughter-house may be kept open.

122. (1) The cantonment authority may, by public notice, limit the hours during which any slaughter-house may be kept open for use and the slaughter of animals may be permitted therein.

(2) A copy of every notice issued under sub-section (1) shall be conspicuously posted in each slaughter-house to which the notice relates.

Power to prohibit or restrict use of slaughter-house.

123. (1) Where it is, in the opinion of the cantonment authority, necessary on sanitary grounds to do so, the cantonment authority may, by public notice, prohibit, for any period not exceeding one month to be specified in the notice, or for such further period, not exceeding one month, as it may from time to time by a like notice specify, the use of any slaughter-house or the slaughter therein of any animal of a description specified in the notice.

(2) A copy of every notice issued under sub-section (1) shall be conspicuously posted in the slaughter-house to which the notice relates.

Licensing of private slaughter-houses.

124. Where the owner or the person in charge of a private slaughter-house applies for a license therefor, such license shall be granted free of charge by the Cantonment Magistrate on his being satisfied—

(*a*) that convenient passages have been provided between any pens, standings or yards in the slaughter-house ;

(*b*) that a sufficient supply of pure water has been provided for the slaughter-house ;

(*c*) that sufficient drains have been provided ;

(*d*) that the premises are so enclosed as to prevent the interior being visible by passers-by : and

(*e*) that suitable arrangements have been made for—

(i) keeping the slaughter-house in a clean and sanitary condition and removing offensive matter and rubbish therefrom ;

(ii) the proper ventilation of the buildings and structures in the slaughter-house ;

(iii) the proper maintenance of the drains and of any public latrines and urinals that may be required for the use of persons frequenting the slaughter-house ;

(iv) the treatment of animals in the slaughter-house ;

(v) the slaughter of animals in a humane manner within an enclosure so constructed that animals placed therein shall be out of sight of animals kept outside ;

(vi) the removal of animals to such enclosure as aforesaid ;

(vii) the disposal or destruction of animals which are offered for slaughter and are from disease or any other cause unfit for human consumption ; and

(viii) the destruction of carcases which from disease or any other cause are found after slaughter to be unfit for human consnmption :

Provided that no license shall be granted for a slaughter-house opened after the commencement of this Code if the slaughter-house is situate at any place which the cantonment authority thinks, especially with regard to any neighbouring drains or water-courses, to be objectionable.

New private slaughter-houses to be licensed.

125. No private slaughter-house shall, after the commencement of this Code, be open to public use until it has been licensed.

Power to require existing private slaughter-houses to be licensed.

126. (1) The cantonment authority may, by notice in writing, require the owner or the person in charge of any private slaughter-house in existence at the commencement of this Code to furnish, within a time to be specified in the notice, any information which may be needed for the purpose of determining whether a license should be required therefor.

(2) On the expiration of such time as aforesaid the cantonment authority shall determine whether or not it is necessary to require a license.

(3) Where the cantonment authority determines that a license shall be required for the slaughter-house, and a license therefor either is not applied for or is refused, the cantonment authority may, by notice in writing, require the owner or the person in charge of the slaughter-house to close the same until a license has been obtained.

Duties of owners or persons in charge of licensed slaughter-houses.

127. The owner or the person in charge of a licensed slaughter-house shall be bound—

(*a*) to maintain convenient passages between any pens, standings or yards in the slaughter-house ;

(*b*) to maintain a sufficient supply of pure water for the slaughter-house ;

(*c*) to keep the slaughter-house in a cleanly and sanitary condition, to provide and maintain receptacles for refuse, and to remove all offensive matter and rubbish from the slaughter-house ;

(*d*) to maintain in good order the drains of the slaughter-house and any public latrines or urinals which may have been provided for the use of persons frequenting it ;

(*e*) to maintain suitable arrangements for the purposes mentioned in section 124, clause (*e*), sub-clauses (iv) to (viii) ; and

(*f*) to prevent the keeping of animals at the slaughter-house for more than twenty-four hours.

Power to suspend or withdraw licenses for slaughter-houses.

128. (1) Where the owner or the person in charge of a licensed slaughter-house commits a breach of any of the provisions of sections 122, 123 and 127, the cantonment uthority may, in addition to any punishment which may be inflicted under this Code, by order in writing, suspend the license for any period to be specified in the order, or withdraw the license.

(2) No slaughter-house, for which a license has been granted under this Chapter, shall be kept open to public use, and no animal shall be slaughtered therein while the license therefor is suspended or after the same has been withdrawn.

(3) A copy of every order made under sub-section (1) shall be conspicuously posted in the slaughter-house to which the order relates.

Register of private slaughter-houses.

129. The Cantonment Magistrate shall maintain a register of all private slaughter-houses which have been licensed under this Chapter, showing—

(*a*) the date on which the license was granted ; and
(*b*) where the license has been suspended, the date and period of the suspension ; or
(*c*) where the license has been withdrawn, the date of the withdrawal.

Slaughtering in slaughter-house when license suspended or withdrawn.

130. Whoever, knowing that a license granted for a slaughter-house is for the time being suspended or has been withdrawn, slaughters any animal therein, shall be punishable with imprisonment for a term which may extend to eight days, or with fine which may extend to fifty rupees.

Levy of stallages, rents and fees in public markets and slaughter-houses.

131. (1) The cantonment authority may—

(*a*) charge, for the occupation or use of any stall, shop, standing, shed or pen in a public market or slaughter-house, and for the right to expose goods for sale in a public market and for weighing and measuring goods sold therein, and for the right to slaughter animals in any public slaughter-house, such stallages, rents and fees as shall from time to time be fixed by it, with the approval of the Officer Commanding the District, in this behalf ; or,

(*b*) with the approval of the Officer Commanding the District, farm the stallages, rents and fees leviable as aforesaid, or any portion thereof, for any period not exceeding one year at a time.

(2) A copy of the table of stallages, rents and fees (if any) leviable in any public market or slaughter-house under sub-section (1), printed in the English language and in such other language or languages as the cantonment authority may direct, shall be affixed in some conspicuous place in the market or slaughter-house, as the case may be.

Import of cattle and flesh.

132. (1) No person shall, without the permission in writing of the cantonment authority, bring into the cantonment any cattle, sheep, goats or swine intended for human consumption or the flesh of any such animal slaughtered outside the cantonment.

(2) Any animal or flesh brought into the cantonment in contravention of sub-section (1) may be seized by the Cantonment Magistrate or by any servant of the cantonment authority and sold or otherwise disposed of as the cantonment authority may direct, the sale-proceeds being credited to the cantonment fund.

(3) Whoever commits a breach of the provision of this section, shall be punishable with fine which may extend to fifty rupees.

Explanation.—Nothing in this section shall be deemed to apply to cured or preserved meat.

Traffic.

Closing and opening of streets.

133. The cantonment authority shall not permanently close any street or open any new street without the previous sanction of the General Officer of the Command.

Rule of the road.

134. Whoever is driving a vehicle along a street, shall, except in case of actual necessity, keep to the left when passing a vehicle coming from the opposite direction, and to the right when passing a vehicle going in the same direction.

Rash riding or driving.

135. No animal shall be ridden or driven, and no vehicle shall be driven, on any street in a rash or negligent manner.

Riding or driving at time or in manner prohibited.

136. No animal shall be ridden or driven, and no vehicle shall be driven, on any street at a time or in a manner prohibited by public notice issued by the cantonment authority or by the District Superintendent of Police.

Use of lamps on vehicles.

137. No vehicle shall be driven, led or kept standing on any street between nightfall and dawn without a suitable lamp, unless there is sufficient moonlight to render a lamp unnecessary.

138. Whoever is driving any elephant or camel on a street, shall remove the same to a safe distance on the approach of a horse or of bullocks drawing a vehicle.

Removal of elephant or camel on approach of horse or vehicle drawn by bullock.

139. No vehicle or animal shall be left on a street without proper control.

Leaving vehicle or animal without proper control.

140. No animal shall be trained, broken in or led for exercise on any street at a time or place prohibited by public notice issued by the cantonment authority.

Training, breaking or exercising animal.

Obstructing street.

141. No person shall—

(*a*) cause any vehicle, with or without an animal harnessed thereto, to remain or stand on any street longer than may be necessary for loading or unloading or for taking up or setting down passengers ; or

(*b*) leave or fasten any vehicle or animal so as to cause obstruction in any street ; or

(*c*) expose any article for sale, whether upon a stall or booth or in any other manner, so as to cause obstruction in any street ; or

(*d*) in any other manner wilfully obstruct or cause obstruction to the free passage of any street.

Burial and Burning Grounds.

142. The cantonment authority may, by notice in writing, require the owner or keeper of any burial or burning ground to supply such information as may be specified in the notice concerning the condition, management or position of such ground.

Power to call for information regarding burial and burning grounds.

143. (1) No place not previously used as a burial or burning ground shall, after the commencement of this Code, be so used without the permission in writing of the cantonment authority.

Permission required for use of new burial or burning ground.

(2) Such permission as aforesaid may be granted subject to any conditions which the cantonment authority may think fit to impose for the purpose of preventing annoyance to, or danger to the health of, persons living in the neighbourhood.

144. (1) Where the cantonment authority is of opinion, after making or causing to be made local inquiry, that any burial or burning ground has become offensive to, or dangerous to the health of, persons living in the neighbourhood, it may, with the previous sanction of the Local Government, by notice in writing, require the owner or keeper of such ground to close the same from a date to be specified in the notice.

Power to require closing of burial or burning ground.

(2) Where the Local Government sanctions the issue of any notice under sub-section (1), it shall declare the conditions on which the burial or burning ground may be re-opened, and a copy of the declaration shall be annexed to the notice.

(3) Where the Local Government sanctions the issue of any such notice as aforesaid, it shall require a new burial or burning ground to be provided at the expense of the cantonment fund, or, if the community concerned is willing to provide a new burial or burning ground, a grant to be made from the cantonment fund towards the cost of the same.

145. No corpse shall be buried or burnt in any burial or burning ground in respect of which a notice issued under section 144, sub-section (1), is for the time being in force.

Prohibition of use of burial or burning ground closed under section 144.

146. No grave shall be made in any burial ground at a less distance than three feet from the margin of the nearest grave.

Distance between graves.

147. No corpse shall, without the permission in writing of the cantonment authority, be buried in any burial ground in a grave of less depth than—

Depth of graves.

(*a*) four feet, where the grave is made of masonry ; or

(*b*) six feet, where the grave is not made of masonry.

148. Every corpse brought to a burial or burning ground shall be buried or burnt, as the case may be, within six hours after it has been so brought.

Corpses to be buried or burnt within six hours.

149. Every corpse brought to a burning ground shall be completely reduced to ashes.

Corpses to be reduced to ashes.

150. Where a corpse has been buried, burnt or otherwise disposed of in contravention of any of the provisions of sections 143, 145, 146, 147, 148 and 149, the cantonment authority may, if it thinks fit, take such order therewith, or with the remains thereof, as shall ensure the proper disposal of the same in accordance with this Code.

Power in respect of improperly disposed of corpses.

151. The provisions of sections 142 to 150 shall not apply to any burial-ground which is for the time being managed under rules published in the Public Works Department Code.

Certain burial-grounds excepted from operation of sections 142 to 150.

CHAPTER IX.

WATER-SUPPLY.

152. All sources of public water-supply (except such as are used for the purposes of waterworks and are for the time being under the control of the Public or Military Works Department) shall be under the control of the cantonment authority.

Control of cantonment authority over sources of public water-supply.

153. Where there are no water-works the cantonment authority shall take all necessary measures for maintaining a supply of pure water, for guarding from pollution water which is used for human consumption, and for preventing polluted water from being so used.

Duty of cantonment authority to maintain supply of pure water, etc.

154. (1) Where, in the opinion of the cantonment authority, the water in any source of public water-supply is likely, if used by any human being or by any milch animal for drinking purposes, to engender or cause the spread of any disorder, the cantonment authority may, by public notice, prohibit the use or removal of the same for all or any of the following purposes, namely :

Power to prohibit use of any source of public drinking water supply.

(*a*) the drink of human beings or admixture with any article of human consumption ;

(*b*) the drink of milch animals, or admixture with any article of food or drink for milch animals ;

(*c*) the washing of vegetables or of cooking utensils ;

(*d*) any other purpose which is likely to cause its introduction into any article of human consumption.

(2) A copy of every notice issued under sub-section (1) shall be conspicuously posted near the source of water-supply to which the notice relates.

155. The cantonment authority may, by notice in writing, require the owner, or any person having control, of any source of public water-supply which is used for drinking purposes,—

Power to require proper maintenance, or closing to public use, of private source of public drinking water-supply.

(*a*) to keep the same in good order, and to clear it from time to time of silt, refuse or decaying vegetation ; or,

(*b*) if the water therein is proved to the satisfaction of the cantonment authority to be unfit for drinking purposes, to take such measures as may be specified in the notice to prevent the public from having access to, or using, such water :

Provided that, in the case of a well, such person as aforesaid may, instead of complying with the notice, signify in writing his desire to be relieved of all responsibility for the proper maintenance of the well and his readiness to place it under the control and supervision of the cantonment authority for the use of the public, and the cantonment authority shall thereupon undertake the control and supervision of the same.

Polluting source of public drinking-water-supply.

156. (1) Whoever—

(*a*) bathes in any source of public water-supply which is used for drinking purposes ; or

(*b*) washes, throws or causes or permits to enter, therein any dog or other animal ; or

(*c*) washes or cleanses therein any clothes, wool, cloth, leather, skin, utensil or other thing ; or

(*d*) throws or allows to flow thereinto any offensive matter or rubbish ; or

(*e*) causes or allows the water of any sink, drain, steam-engine or boiler, or any other filthy or polluted water, belonging to him or under his control, to flow thereinto ; or

(*f*) does any other act whereby the water thereof is polluted or is likely to be polluted ;

shall be punishable with imprisonment for a term which may extend to eight days, or with fine which may extend to fifty rupees.

(2) For the purposes of this section the cantonment authority may, by public notice, declare what sources of public water-supply are used for drinking purposes.

(3) A copy of every notice issued under sub-section (2) shall be conspicuously posted near the source of water-supply to which the notice relates.

Impairing quality, or diminishing quantity, of water in source of public drinking-water-supply or impairing usefulness of water-works.

157. The cantonment authority may, by public notice, prohibit any act specified in the notice which would, in its opinion,—

(*a*) impair the quality or diminish the quantity of the water in any source of public water supply which is set apart for public use and is used for drinking purposes ; or

(*b*) injure or impair the usefulness of any of the pipes, locks, cocks or other fittings of water-works.

Trespass on water-works.

158. (1) The cantonment authority may, by public notice, prohibit trespasses upon land occupied by water-works.

(2) A copy of every notice issued under sub-section (1) shall be conspicuously posted on the land to which the notice relates.

Altering, obstructing or encroaching upon public water-channel.

159. (1) No person shall, without the permission in writing of the cantonment authority alter, obstruct, or encroach upon, any public water-channel.

(2) The cantonment authority may, by notice in writing, require any person who has made any such alteration, obstruction or encroachment as aforesaid, to remove, or desist from, the same.

Power to prohibit polluting of source of public water supply by fishing, boating, or gathering flowers or plants.

160. (1) The cantonment authority may, by public notice, prohibit fishing, boating or the gathering of flowers or plants, generally or by any particular method specified in the notice, in any source of public water-supply, where it considers that any such act is likely to cause danger to the public health.

(2) A copy of every notice issued under sub-section (1) shall be conspicuously posted near the source of water-supply to which the notice relates.

Throwing of corpse into source of public water-supply.

161. No person shall throw a corpse into any source of public water-supply.

Power to prohibit pollution of source of public water-supply by carrying on offensive trade.

162. The cantonment authority may, by notice in writing, require the owner, lessee or occupier of any place in which is carried on any offensive trade or manufacture whereby the water in any source of public water-supply is polluted, to take steps to abate such pollution.

Placing latrine, etc., or depositing offensive matter or rubbish, near source of public water-supply.

163. No person shall, without the permission in writing of the cantonment authority,—

(*a*) place any latrine, urinal, cesspool or drain, or

(*b*) use for the deposit of offensive matter or rubbish any place,

within fifty feet of any source of public water-supply.

Removal of latrine, etc., near any source of public water-supply.

164. The cantonment authority may, by notice in writing, require any lessee, owner or occupier on whose land any latrine, urinal, cesspool, drain or other receptacle for offensive matter exists within fifty feet of any source of public water-supply, to remove or close the same within one week from the service of the notice.

Bathing or washing at public well or spring.

165. Whoever—

(*a*) bathes, or

(*b*) washes any animal, or any clothes, wool, cloth, leather, skin, utensil or other thing,

by the side of any public well or spring so as to pollute the water thereof, shall be punishable with imprisonment for a term which may extend to eight days, or with fine which may extend to fifty rupees.

Regulation of public bathing and washing.

166. (1) The cantonment authority may, by public notice, prohibit—

(*a*) bathing, or

(*b*) the washing of animals or of clothes, wool, cloth, leather, skins, utensils or other things, or of any class of such things,

by the public or any class thereof at any public place specified in the notice.

(2) The cantonment authority may, by public notice,—

(*a*) appoint places for—

(i) bathing, or

(ii) the washing of animals or of clothes, wool, cloth, leather, skins, utensils or other things, or any class of such things ; and

(*b*) fix the hours at which alone bathing or washing may be carried on at any place so appointed.

(3) In any notice issued under sub-section (1), separate places may be appointed for bathing and washing, respectively, and separate places may be appointed for bathing by men and women, respectively.

(4) A copy of every such notice as aforesaid shall be conspicuously posted on or near the place or places to which the notice relates.

Explanation.—In this section, the expression " washing an animal " includes driving or throwing an animal, or permitting it to go, into water.

CHAPTER X.

Trades, Callings and Occupations.

Licenses required for carrying on of certain occupations.

167. No person of any of the following classes, namely :

(*a*) butchers, and sellers of poultry, game or fish ;

(*b*) persons keeping pigs for profit, and dealers in the flesh of pigs which have been slaughtered in India ;
(*c*) persons keeping milch cattle or milch goats for profit ;
(*d*) persons keeping for profit any animals other than pigs, milch cattle or milch goats ;
(*e*) dairymen and buttermen ;
(*f*) makers of bread, biscuits or cake, and sellers of bread, biscuits or cake made in India ;
(*g*) sellers of fruit or vegetables ;
(*h*) manufacturers of aërated or other potable waters, or ice, and sellers of the same ;
(*j*) sellers of any medicines, drugs or articles of food or drink for human consumption (other than the flesh of pigs, milk, butter, bread, biscuits, cake, fruit, vegetables, aërated or other potable waters, or ice) which are of a perishable nature ;
(*k*) sellers of water to be used for drinking purposes ;
(*l*) washermen ;
(*m*) dealers in hay, straw, wood, charcoal or other inflammable material ;
(*n*) details in fireworks, kerosine oil, petroleum or any other inflammable oil or spirit ;
(*o*) tanners and dyers ; and
(*p*) persons carrying on any trade or occupation from which offensive or unwholesome smells arise ;

shall carry on his trade, calling or occupation in any part of the cantonment, unless he has applied for and obtained a license from the cantonment authority :

Provided, first, that a license shall not be withheld if the applicant is willing to comply with such conditions as the cantonment authority may think fit to impose under section 168 :

Provided, secondly, that no charge shall be made for any license granted under this section : and

Provided, thirdly, that no person who is, at the commencement of this Code carrying on his trade, calling or occupation in any part of the cantonment shall be bound to apply for a license for carrying on such trade, calling or occupation in that part until he has received from the cantonment authority not less than three months' notice in writing of his obligation to do so, and that, if the cantonment authority refuses to grant him a license, it shall pay him reasonable compensation for any loss incurred by reason of such refusal.

Conditions which may be entered in such licenses.

168. A license granted to any person under section 167 shall specify the part of the cantonment in which the licensee may carry on his trade, calling or occupation, and may contain any conditions which the cantonment authority may think fit to impose with respect to the following matters, namely :

(*a*) in the case of butchers, and sellers of poultry, game or fish,—
  (i) the apparatus and coverings to be used in the operations of their trade ;
  (ii) the places at which, and the manner in which, meat, poultry, game or fish may be exposed for sale ; and
  (iii) the disposal of meat, poultry, game or fish when found to be unfit for human consumption :
(*b*) in the case of persons keeping pigs for profit, and dealers in the flesh or pigs which have been slaughtered in India,—
  (i) the places at which pigs may be kept ;
  (ii) the number of pigs which may be kept at any one place ;
  (iii) the season and the places at which pigs may be slaughtered and the flesh offered for sale ;
  (iv) the manner in which pigs shall be inspected prior to slaughter ; and
  (v) the manner in which the flesh thereof shall be inspected and marked prior to sale, and disposed of when found to be unfit for human consumption :
(*c*) in the case of persons keeping milch cattle or milch goats for profit,—
  (i) the places at which such animals may be kept ;
  (ii) the number of such animals which may be kept at any one place ;

(iii) the sources from which such animals shall be watered ;
(iv) the segregation of any sick or diseased animals ; and
(v) the taking of any other measures which the cantonment authority may think necessary for maintaining the premises in a clean and sanitary state :

(*d*) in the case of persons keeping for profit any animals other than pigs, milch cattle or milch goats,—
(i) the places at which such animals may be kept ;
(ii) the number of such animals which may be kept at any one place ; and
(iii) the manner of keeping the animals so as to prevent their becoming a public nuisance or injurious to the public health :

(*e*) in the case of dairymen and buttermen,—
(i) the vessels and other apparatus to be used in the operations of their trade ;
(ii) the places at which and the manner in which milk or butter may be prepared and kept for sale ; and
(iii) the taking of any other measures which the cantonment authority may consider necessary for keeping the premises and all vessels and apparatus in a clean and sanitary state :

(*f*) in the case of makers of bread, biscuits or cake, and sellers of bread, biscuits or cake made in India,—
(i) the apparatus and the water, flour and other ingredients which may be used in the operations of their trade ;
(ii) the places at which bread, biscuits or cake may be prepared and kept for sale ;
(iii) the inspection to be exercised over the making of such articles ; and
(iv) the disposal of any such articles which may be found to be unwholesome :

(*g*) in the case of sellers of fruit or vegetables,—
(i) the places and seasons at which fruit or vegetables, or any specified kinds of fruit or vegetables, may be sold ; and
(ii) the disposal of any fruit or vegetables which may be found to be unwholesome, or of which the sale has been prohibited under clause (*g*), sub-clause (*i*) :

(*h*) in the case of manufacturers of aërated or other potable waters, or ice, and sellers of the same,—
(i) the sources from which water used in such manufacture shall be taken ;
(ii) the machinery, chemicals and ingredients which may be used in such manufacture ;
(iii) the measures to be taken in order to ensure the proper filtering of the water used and the cleanliness of all apparatus and receptacles used ; and
(iv) the attachment of labels or the adoption of other means for the purpose of identifying the factory at which each article was made :

(*j*) in the case of sellers of any medicines, drugs or articles of food or drink for human consumption (other than the flesh of pigs, milk, butter, bread, biscuits, cake, fruit, vegetables, aërated or other potable waters, or ice) which are of a perishable nature, the disposal of any articles which may be found to be unwholesome :

(*k*) in the case of sellers of water to be used for drinking purposes,—
(i) the sources from which such water shall be taken ; and
(ii) the taking of measures to ensure the cleanliness of mussuks or any other vessels or utensils used for carrying such water :

(*l*) in the case of washermen, the places at which clothes may be washed, dried or kept :

(*m*) in the case of dealers in hay, straw, wood, charcoal or other inflammable material,—
(i) the places at which such materials may be kept ;
(ii) the quantity which may be stored at any one place, and the manner of storing ; and

(iii) the precautions against fire to be taken by the dealer or the person in charge of the business :

(*n*) in the case of dealers in fireworks, petroleum, kerosine oil or any other inflammable oil or spirit,—

(i) the places at which, and the quantities in which, any such article may be stored or kept for sale : and

(ii) the taking of any measures which the cantonment authority may consider necessary for the prevention of danger to life or property :

(*o*) in the case of tanners and dyers, the taking of measures for regulating the discharge of refuse matter from their premises and for abating any nuisance arising from such premises ; and

(*p*) in the case of persons carrying on any trade or occupation from which offensive or unwholesome smells arise, the taking of any measures which the cantonment authority may consider necessary for the abatement of any nuisance arising from the premises.

Explanation.—For the purposes of clause (*a*), sub-clause (iii), meat which has been subjected to the process of blowing, shall be presumed to be unfit for human consumption.

Power of cantonment committee to make bye-laws as to vehicles, etc.

169. The cantonment committee (if any) may, by bye-laws made at a meeting of which at least six clear days' notice has been given,—

(*a*) render licenses necessary for the proprietors or drivers of vehicles, boats or animals kept or plying for hire within the cantonment, and fix the fees payable for such licenses and the conditions on which they are to be granted and may be revoked, and

(*b*) limit the rates which may be demanded for the hire of any carriage, cart, boat or other conveyance, or of animals hired to carry loads, or for the services of persons hired to carry loads, and the loads to be carried by such conveyances, animals or persons when hired in the cantonment for a period not exceeding twenty-four hours, or for a service which would ordinarily be performed within twenty-four hours :

Provided that no bye-law made under this section by the cantonment committee of a cantonment in which the Hackney Carriage Act, 1879, or Bengal Act V of 1866 (*an Act to make better provision for the regulation of hackney carriages and palankeens in the town and suburbs of Calcutta*), or the Calcutta Hackney Carriage Act, 1891, or the Madras Hackney Carriage Act, 1879, or Bombay Act VI of 1863 (*an Act for the regulation of public conveyances in the town, suburbs and harbour of Bombay*) is in force, shall apply to any vehicle to which any of those Acts applies. XIV of 1897. Ben. Act II. of 1891. Mad. Act. III of 1879.

Feeding animals on filth, etc.

170. No person holding a license under section 167 for keeping for profit milch cattle or milch goats, or pigs or any other animal which may be used for human consumption, shall allow the same—

(*a*) to be fed upon refuse or any filthy or deleterious substance ; or

(*b*) to graze in any place in which grazing has for sanitary reasons been prohibited by public notice issued by the cantonment authority.

Adulteration of milk.

171. No dairyman holding a license under section 167 shall mix water with, or otherwise adulterate, any milk intended for sale

Adulteration of butter.

172. No butterman holding a license under section 167 shall adulterate any butter intended for sale.

Selling food or drink unfit for human consumption.

173. No person holding a license under section 167 shall sell any article of food or drink for human consumption which is unfit for that purpose.

Power to remove brothels and prostitutes.

174. (1) The cantonment authority may, by notice in writing, prohibit—

(*a*) the keeping of a brothel, or

(*b*) the residence of a public prostitute,

in the cantonment or in any specified part thereof.

(2) Whoever fails to comply with a notice issued under sub-section (1), shall be punishable with imprisonment for a term which may extend to eight days, or with fine which may extend to fifty rupees, and, in the case of a continuing failure, with an additional fine not exceeding five rupees for every day after the first in regard to which he is convicted of having persisted in the failure.

Exclusion of public prostitutes from regimental bazars.

175. No public prostitute shall be permitted to reside within the limits of any regimental bazar situate in the cantonment.

Power to suspend or withdraw license.

176. (1) Where any person, holding a license under section 167 or section 169, commits a breach of any of the provisions of sections 168, 170, 171, 172 and 173, the cantonment authority may, in addition to any punishment which may be inflicted under this Code, by order in writing, suspend the license for any reasonable time to be specified in the order, or withdraw the same.

(2) No person who has obtained a license under this Chapter for carrying on a trade, calling or occupation in any part of the cantonment, shall carry on such trade, calling or occupation in that part while such license is suspended or after the same has been withdrawn.

CHAPTER XI.

Prevention and Treatment of Disease.

Infectious or Contagious Disorders.

Information to be given of existence of infectious or contagious disorder.

177. Whoever,—

(*a*) being a medical practitioner and in the course of practice becoming cognizant of the existence of any infectious or contagious disorder in any dwelling, other than a public hospital or dispensary, in the cantonment or its neighbourhood ; or,

(*b*) in default of such medical practitioner, being the owner or occupier of such dwelling and being cognizant of the existence of any infectious or contagious disorder therein ; or

(*c*) in default of such owner or occupier, being the person in charge of, or in attendance on, any person suffering from any infectious or contagious disorder in such dwelling and being cognizant of the existence of the disorder therein ;

fails to give information or gives false information to the cantonment authority respecting the existence of such disorder, shall be punishable with fine which may extend to fifty rupees :

Provided that a person not required by this section to give information in the first instance, but only in default of some other person, shall not be punishable if it is shown that he had reasonable cause to suppose that the information had been, or would be, duly given :

Provided, also, that this section shall not apply to venereal disease where the person suffering therefrom is under specific and adequate medical treatment, and, by reason of habits, conditions of life and residence, is unlikely to spread the disease.

Explanation.—In this section, the expression " infectious or contagious disorder " includes venereal disease.

Special measures on outbreak of infectious or contagious disorder among inhabitants, or epidemic disease among cattle.

178. (1) In the event of the cantonment being at any time visited or threatened by an outbreak of any infectious or contagious disorder among the inhabitants thereof, or of any epidemic disease among the cattle, sheep or goats therein, the General Officer of the Command, if he thinks that the provisions of this Code

or of any law at the time in force are insufficient for the purpose, may, with the previous sanction of the Local Government,—

(*a*) take such special measures, and

(*b*) by public notice, prescribe such temporary regulations to be observed by the public or by any person or class of persons,

as he thinks necessary to prevent the outbreak of the disorder or disease or the spread thereof.

(2) Whoever commits a breach of any temporary regulation prescribed under sub-section (1), shall be deemed to have committed an offence punishable under section 188 of the Indian Penal Code. XLV. of 1860.

Power to require names of dairyman's customers.

179. Where it is certified to the Cantonment Magistrate by a medical practitioner that the outbreak or spread of any infectious or contagious disorder is, in the opinion of such medical practitioner, attributable to the milk supplied by any dairyman, the Cantonment Magistrate may, by notice in writing, require the dairyman, within a time to be specified in the notice, to furnish him with a full and complete list of the names and addresses of all his customers within the cantonment, or to give him such information as will enable him to trace the persons to whom the dairyman has sold milk.

Power to require names of washerman's customers.

180. Where it is certified to the Cantonment Magistrate by the Sanitary Officer that it is desirable, with a view to prevent the spread of any infectious or contagious disorder, that the Sanitary Officer should be furnished with a list of the customers of any washerman, the Cantonment Magistrate may, by notice in writing, require the washerman, within a time to be specified in the notice, to furnish the Sanitary Officer with a full and complete list of the names and addresses of all owners within the cantonment of clothes and other articles for whom the washerman washes or has washed during the six weeks immediately preceding the date of the notice.

Report after inspection of dairy or washerman's place of business.

181. Where, after inspection, the Sanitary Officer is of opinion that any infectious or contagious disorder is caused, or is likely to arise, from the consumption of the milk supplied from a dairy, or from the washing of soiled clothes or other articles in any place, or from any process employed by a washerman, he shall report the matter to the Cantonment Magistrate.

Action on report submitted under section 181.

182. Upon receipt of a report submitted under section 181, the Cantonment Magistrate may, by notice in writing,—

(*a*) prohibit the person in charge of the dairy from supplying milk therefrom until the notice has been withdrawn ; or, as the case may be,

(*b*) prohibit the washerman from washing soiled clothes or other articles in any such place or by any such process as aforesaid until the notice has been withdrawn or unless he uses such place in such manner or washes by such process as the Cantonment Magistrate may direct in the notice.

Examination of milk or washed clothes.

183. The Sanitary Officer, or any Medical Officer of the Government appointed by him in this behalf, may take possession of any milk, clothes or other articles which are, or have recently been, in the possession of any dairyman or washerman on whom a notice under section 179 or section 180 has been served, and may subject the same or cause the same to be subjected to such chemical or other process as he may think necessary ; and the cantonment authority shall pay from the cantonment fund all the costs of the process, and shall also pay to the owner of the milk, clothes or other articles such sum as compensation for any loss occasioned by such process as may in the circumstances appear to it to be reasonable.

Contamination of public conveyances.

184. Whoever—

(*a*) enters a public conveyance while suffering from an infectious or contagious disorder which would be likely to be communicated to other persons using the conveyance ; or

(*b*) uses a public conveyance for the carriage of a person who is suffering from any such disorder ; or

(*c*) uses a public conveyance for the carriage of the corpse of a person who has died from any such disorder ;

shall be bound to notify the fact to the driver and to report to the Cantonment Magistrate the number of the conveyonce and the name of the driver.

Disinfection of public conveyances.

185. Where any person suffering, or the corpse of any person who has died, from an infectious or contagious disorder, has been carried in a public conveyance, the driver shall forthwith report the fact to the officer in charge of the nearest police-station in the cantonment, and that officer shall forthwith cause the conveyance to be disinfected, if that has not already been done.

Disinfection of building or articles therein, or renewal of flooring.

186. Where the Cantonment Magistrate is, upon the advice of the Sanitary Officer, of opinion that the cleansing or disinfecting of any building or part of a building, or of any articles therein likely to retain infection, or the renewal of the flooring of any building or part of a building, would tend to prevent or check the spread of any infectious or contagious disorder, he may, by notice in writing, require the owner or occupier to cleanse and disinfect the said building, part or articles, or to renew the said flooring, within a time to be specified in the notice :

Provided that, where, in the opinion of the Cantonment Magistrate, the owner or occupier is, from poverty or any other cause, unable effectually to carry out any such requisition, the Cantonment Magistrate may, at the expense of the cantonment fund, cleanse or disinfect the building or part, or any articles therein likely to retain infection, or renew the said flooring.

Destruction of infected hut or shed.

187. Where the destruction of any hut or shed is, in the opinion of the cantonment authority, necessary to prevent the spread of any infectious or contagious disorder, the cantonment authority may, by notice in writing, require the owner, within a time to be specified in the notice, to destroy the hut or shed and the materials thereof :

Provided that the cantonment authority shall pay to the owner such sum as may in the circumstances appear to it to be equitable for any loss incurred by reason of the destruction of such hut, shed or materials.

Temporary shelter while building is being disinfected or when infected hut is destroyed.

188. The cantonment authority shall provide free of charge temporary shelter or house accommodation for the members of any family in which an infectious or contagious disorder has appeared, who have been compelled to leave their dwellings, by reason of any proceedings taken under section 186 or section 187, and desire any shelter or accommodation as aforesaid to be provided for them.

Disinfection of building and articles therein before letting the building.

189. Whoever lets a building or part of a building in which any person has, within the six weeks immediately preceding, been suffering from an infectious or contagious disorder, shall, before letting the building or part, disinfect the same, in such manner as the cantonment authority may, by public or special notice, direct, together with all articles therein liable to retain infection.

Explanation.—For the purposes of this section, the keeper of a sarai shall be deemed to let part of a building to any person who is admitted as a guest into the sarai.

Disposal of infected article without disinfection.

190. No person shall, without previous disinfection of the same, give, lend, sell, transmit or otherwise dispose of to another person any article or thing which he has reason to know has been exposed to contamination by any infectious or contagious disorder.

Disposal of infectious matter.

191. The cantonment authority shall, by public notice, prescribe the manner in which infectious excreta and other matter is to be dealt with or disposed of.

Making or selling of food, etc., or washing of clothes, by infected person.

192. Whoever, while suffering from an infectious or contagious disorder,—

(*a*) makes or offers for sale any article of food or drink for human consumption, or any medicine or drug ; or

(*b*) takes any part in the business of washing or carrying soiled clothes ;

shall be punishable with imprisonment for a term which may extend to eight days, or with fine which may extend to fifty rupees.

Power to prohibit the making, carrying or selling of clothes, bedding or other articles by infected person.

193. The cantonment authority may, by notice in writing, prohibit any person, while suffering from, or likely to spread, any infectious or contagious disorder, from making, carrying or offering for sale, or from taking any part in the business of making, carrying or offering for sale, any article of clothing or bedding, or anything for use in the making of clothing or bedding, or any other article for personal wear or use which may be specified in the notice.

Power to restrict or prohibit sale of specified articles of food or drink, on outbreak of infectious or contagious disorder.

194. When any cantonment is visited or threatened by an outbreak of any infectious or contagious disorder, the cantonment authority may, on the advice of the District Magistrate and the Sanitary Officer, by public notice, restrict in such manner, or prohibit for such period, as may be specified in the notice, the sale or preparation of any article of food or drink for human consumption specified in the notice or the sale of the flesh of any description of animal specified in the notice.

Disposal of infected corpse.

195. Where any person has died from any infectious or contagious disorder, the Cantonment Magistrate may, by notice in writing,—

(*a*) require any person having charge of the corpse—

(i) to bury, burn or otherwise dispose of the same according to the custom of the class to which the deceased belonged, forthwith or within any period, not being less than twenty-four hours after death, to be specified in the notice, or

(ii) to convey the same to a mortuary, thereafter to be disposed of in accordance with law ; or

(*b*) prohibit the removal of the corpse from the place where death occurred, except for the purpose of being buried, burnt or otherwise disposed of as aforesaid or of being conveyed to a mortuary.

Hospitals and Dispensaries.

Maintenance or aiding of hospitals and dispensaries.

196. (1) So far as the funds at its disposal permit, the cantonment authority, may—

(*a*) provide and maintain, either within or without the cantonment, as many hospitals or dispensaries as may be necessary ; or

(*b*) make, upon such terms as it thinks fit to impose, a grant-in-aid to any hospital or dispensary, whether within or without the cantonment, not maintained by it.

(2) Every hospital or dispensary maintained or aided under sub-section (1) shall have attached to it a ward or wards for the treatment of persons from infectious or contagious disorders.

Explanation.—In this section, the expression "infectious or contagious disorder" includes venereal disease.

Medical Officer to be in charge of hospital or dispensary.

197. A Medical Officer, to be appointed in such manner as the Local Government may direct, shall be in charge of every hospital or dispensary maintained or aided under section 196.

Subordinate establishments for hospitals or dispensaries.

198. Subject to the control over the cantonment fund which is vested in the Local Government by section 23 of the Cantonments Act, 1889, there shall be appointed, for every hospital or dispensary maintained or aided under section 196, such subordinate establishment as may be necessary.

Cantonments —XIII of, or—1889.

199. So far as the funds at its disposal permit, the cantonment authority shall cause every hospital or dispensary maintained or aided under section 196 to be provided with—

Medical supplies, appliances, etc.

(*a*) all requisite drugs, instruments, apparatus, furniture and appliances ;
(*b*) sufficient cots, bedding and clothing for in-patients ; and
(*c*) such further requisites as may be necessary.

200. Every hospital or dispensary maintained or aided under section 196, shall be maintained in accordance with the rules made, generally or specially, by the Governor General in Council or the Local Government for the conduct of hospitals and dispensaries, or in accordance with the said rules modified in such manner as the Governor General in Council or the Local Government may think fit.

Application of civil hospital rules.

201. At every hospital or dispensary maintained or aided under section 196 the sick poor of the cantonment, persons in the cantonment suffering from infectious or contagious disorders, and, with the sanction of the cantonment authority, any other sick persons, may receive medical treatment free of cost, and, if treated as in-patients, shall be either dieted gratuitously or, should the Medical Officer in charge so direct, granted subsistence allowance on a scale to be determined by the cantonment authority :

Free patients.

Provided that the subsistence allowance granted as aforesaid shall not be less than the lowest allowance for the time being fixed for the subsistence of judgment debtors by the Local Government under section 338 of the Code of Civil Procedure.

Explanation.—In this section, the expression "infectious or contagious disorder" includes venereal disease.

202. Any sick person who is ineligible under section 201 to receive medical treatment free of cost in any hospital or dispensary maintained or aided under section 196, may, upon such terms as the cantonment authority thinks fit to impose, be admitted to treatment in such hospital or dispensary.

Paying patients.

203. If the Medical Officer in charge of a hospital or dispensary maintained or aided under section 196 has *primâ facie* grounds for believing that any person living in the cantonment is suffering from an infectious or contagious disorder, he may, by notice in writing in the form set forth in Schedule II. or in any similar form, call upon such person to attend at the hospital or dispensary at a time to be specified in the notice, and not to quit it without the permission of the Medical Officer in charge, unless and until such Medical Officer is satisfied, by examination (if necessary), that such person is not in fact suffering, or is no longer suffering, from such disorder.

Power to call upon person suffering from infectious or contagious disorder to attend at, and remain in, hospital or dispensary.

Provided that, if, having regard to the nature of the disorder, or the condition of the person suffering therefrom, or the general environment and circumstances of such person, the Medical Officer considers the attendance of such person at the hospital or dispensary inexpedient, he may dispense with such attendance and take such measures or give such directions as he may think fit and proper.

Explanation.—In this section, the expression "infectious or contagious disorder" includes venereal disease.

204. (1) If the Medical Officer in charge of a hospital or dispensary maintained or aided under section 196 reports in writing to the Commanding Officer of the cantonment that any person, having received a notice as provided by section 203, has refused or omitted to attend at the hospital or dispensary, or that such person having attended at the hospital or dispensary, has quitted it without the permission of such Medical Officer, the Commanding Officer of the cantonment may, if he thinks fit, by order in writing, direct such person to remove from the cantonment within twenty-four hours, and prohibit him from remaining longer in, or re-entering, it without his permission in writing.

Power to exclude from cantonment persons refusing to attend at or remain in hospital or dispensary.

(2) Whoever, having been prohibited under sub-section (1) from remaining in or re-entering the cantonment, fails to remove from or re-enters it without the permission in writing of the Commanding Officer of the cantonment, shall be punishable with imprisonment for a term which may extend to eight days, or with fine which may extend to fifty rupees, and, in the case of a continuing failure, with an additional fine not exceeding five rupees for every day after the first in regard to which he is convicted of having persisted in the failure.

Introducing liquor or drug into hospital or dispensary.

205. No spirituous or fermented liquor or intoxicating drug or preparation shall be introduced into a hospital or dispensary maintained or aided under section 196 without the permission of the Medical Officer in charge.

Cholera hospitals and camps in cantonments.

206. (1) No land in the cantonment shall be selected for use as a cholera hospital or cholera camp without giving the Cantonment Magistrate and the Sanitary Officer an opportunity of stating their opinions upon the proposed selection.

(2) Where any land in the cantonment is used as aforesaid, it shall be ploughed up as soon as practicable after it has ceased to be so used.

Pilgrims.

Routes for pilgrims and others.

207. (1) The cantonment authority may provide or prescribe suitable routes for the use of persons passing through the cantonment—

(*a*) on their way to or from fairs or places of pilgrimage or other places of public resort ; or

(*b*) during times when an infectious or contagious disorder is prevalent ;

and may, by public notice, require such persons as aforesaid to use such routes and no others.

(2) All routes provided or prescribed under sub-section (1) shall be clearly and sufficiently indicated by the cantonment authority.

CHAPTER XII.

SUPPRESSION OF MENDICANCY AND LOITERING AND REMOVAL OF DISORDERLY PERSONS.

Mendicancy.

Mendicancy.

208. No mendicant shall, in any street or public place in the cantonment, loiter or beg for alms.

Loitering and Importuning.

Loitering or importuning for sexual immorality.

209. Whoever, in any street or public place in the cantonment, loiters for the purpose of prostitution or importunes any person to the commission of sexual immorality, shall be punishable with imprisonment for a term which may extend to eight days, or with fine which may extend to fifty rupees :

Provided that no person shall be charged with a breach of the provisions of this section except on the complaint of the person importuned, or of an officer, as defined in the Cantonments Act, 1889, in whose presence the breach was committed, or of a member of the British military police-force employed in the cantonment and specially authorized in this behalf by the Commanding Officer of the cantonment, in whose presence the breach was committed. XIII. of 1889.

Removal of Disorderly Persons.

Removal and exclusion from cantonment of disorderly persons, etc.

210. (1) The Cantonment Magistrate may, on receiving information that any person, whether resident in or frequenting the cantonment,—

(*a*) is a disorderly person keeping or frequenting a common gaming-house, a disorderly drinking-shop, or a disorderly house of any other description, or

XLV. of 1860.

(*b*) has been convicted more than once, either within the cantonment or elsewhere, of an offence punishable under Chapter XVII. of the Indian Penal Code, or

44 & 45 Vict., c. 58.

(*c*) has been convicted, either within the cantonment or elsewhere, of any offence punishable under section 156 of the Army Act, or

V. of 1898.

(*d*) has been ordered, under Chapter VIII. of the Code of Criminal Procedure, 1898, either within the cantonment or elsewhere, to execute a bond for his good behaviour,

may make an order in writing, setting forth the substance of the information received, and issue a summons requiring the person to show cause why he should not be required to remove from the cantonment and be prohibited from re-entering it.

(2) Every summons issued under sub-section (1) shall be accompanied by a copy of such order as aforesaid, and the copy shall be delivered by the officer serving the summons to the person served with the same.

(3) The Cantonment Magistrate shall, when the person so summoned appears before him, proceed to inquire into the truth of the information received, and take such further evidence as he thinks fit, and, if, upon such inquiry, it appears to him to be necessary for the maintenance of good order that the person should be required to remove from the cantonment and be prohibited from re-entering it, the Cantonment Magistrate shall report the matter to the Commanding Officer of the cantonment and, if the Commanding Officer of the Cantonment so directs, shall issue a notice in writing requiring the person to remove from the cantonment within a time to be specified in the notice and prohibiting him from re-entering it without the permission in writing of the Commanding Officer of the cantonment.

General power of removal and exclusion from cantonment.

211. (1) The Commanding Officer of the cantonment, if he thinks it expedient to exclude any person from the cantonment, whether with or without assigning any reason therefor, shall send to the Cantonment Magistrate an order in writing to that effect, and the Cantonment Magistrate shall cause a copy of the order to be served on the person, together with a notice in writing requiring him to remove from the cantonment within a time to be specified in the notice and prohibiting him from re-entering it without the permission in writing of the Commanding Officer of the cantonment :

Provided that no such order as aforesaid shall be made—

(*a*) where the only reason for making it is that the person—

(i) is disorderly, or

XLV. of 1869. 44 & 45 Vict., c. 58. V. of 1898.

(ii) has been convicted of an offence punishable under Chapter XVII. of the Indian Penal Code or section 156 of the Army Act, or

(iii) has been ordered under Chapter VIII. of the Code of Criminal Procedure, 1898, to execute a bond for his good behaviour ; or

(*b*) unless the Commanding Officer of the cantonment thinks that the presence of the person in the cantonment is dangerous to good order or military discipline.

(2) A copy of every order made under sub-section (1) shall forthwith be sent by the Commanding Officer of the cantonment to the General Officer of the Command.

Harbouring or concealing person ordered to remove from and prohibited from re-entering a cantonment.

212. Whoever, knowing that any person has, under section 210 or section 211, been required to remove from the cantonment and has not obtained the requisite permission to re-enter it, harbours or conceals such person in the cantonment, shall be punishable with imprisonment for a term which may extend to eight days, or with fine which may extend to fifty rupees.

CHAPTER XIII.

CARE OF ANIMALS.

Prevention of cruelty.

Cruelty to animals.

213. Whoever ill-uses, tortures or cruelly beats any animal in the cantonment, shall be punishable with imprisonment for a term which may extend to eight days, or with fine which may extend to fifty rupees.

Extensions of the Prevention of Cruelty to Animals Act, 1890, to cantonments.

214. (1) Unless the General Officer of the Command concurs with the cantonment authority in thinking that there is some special reason to the contrary, the cantonment authority shall apply to the Local Government to extend the Prevention of Cruelty to Animals Act, 1890, to the cantonment. XI. of 1890.

(2) In making an application under sub-section (1) the cantonment authority shall, unless there is some special reason to the contrary, suggest that the place appointed to be an infirmary under section 6, sub-section (2), of the said Act shall be the pound (if any) established for the cantonment under the Cattle-trespass Act, 1871. I. of 1871.

(3) Where the Prevention of Cruelty to Animals Act, 1890, has been extended to any cantonment, the provisions of section 213 of this Code shall cease to have effect therein.

Grazing.

Animals grazing to be kept under proper care and control.

215. Every owner, or the person in charge, of an animal grazing on any land belonging to the Government in the cantonment shall be bound to keep it under proper care and control.

Impounding of animals grazing without being under proper care or control.

216. (1) Where any animal is found grazing on land belonging to the Government in the cantonment without being under proper care or control, it may be seized by any servant of the cantonment authority and sent within twenty-four hours to the nearest pound established under section 4 of the Cattle-trespass Act, 1871. I. of 1871.

(2) Every animal so sent to the pound shall be dealt with as if it had been impounded under the provisions of the said Act, and the provisions of the said Act shall apply thereto.

(3) Every member of the police-force employed in the cantonment shall, when required, aid in preventing resistance to any such seizure as aforesaid and rescues from persons making such seizures.

Person taking delivery of animal from pound to state names of owner and person who had charge of the animal at time of seizure.

217. (1) Whoever takes delivery of any animal impounded from the pound-keeper (if any) appointed under section 6 of the Cattle-trespass Act, 1871, shall inform the pound-keeper of the name of the owner of the animal and the name of the person who had charge of the same at the time of its seizure. I. of 1871.

(2) Whoever refuses to give the pound-keeper the information required by this rule, or wilfully gives him false information, shall be punishable with fine which may extend to fifty rupees.

CHAPTER XIV.

Prevention of Fire.

Stacking or collecting inflammable materials, or building matted structures in cantonment.

218. (1) No person shall, in any place in the cantonment within one hundred yards of a public building or building having a thatched roof, or in any other place in which the collection or placing of highly inflammable materials may be prohibited by public notice issued by the cantonment authority,—

(*a*) stack or collect dry grass, straw or any other highly inflammable material, or

(*b*) build a matted structure or a cooking-place.

(2) The cantonment authority may, by notice in writing, require any person who has stacked or collected any grass, straw or other highly inflammable material, or has built a matted structure or a cooking-place, in contravention of the provisions of sub-section (1), to remove such stack, collection or structure as aforesaid within a time to be specified in the notice.

Letting-off fireworks, sending up fire balloons, or lighting bonfire, without permission.

219. No person shall, without the general or special permission of the cantonment authority, let off rockets or fire-works of any description, send up a fire-balloon or light a bonfire.

Setting naked light on or near building.

220. No person shall set a naked light on or near any building in any street or public place in the cantonment in such manner as to cause danger of fire :

Provided that this prohibition shall not extend to the use of lights, with the permission in writing of the cantonment authority, for purposes of illumination on the occasion of a festival or public or private entertainment.

CHAPTER XV.

Registration of Births and Deaths.

Registers of births and deaths to be maintained.

221. (1) The Cantonment Magistrate shall maintain registers, in such forms as may be prescribed by the Local Government, of all births and deaths occurring in the cantonment.

(2) No charge shall be made for the registration of any birth or death under this Chapter.

Duty of head of house or family to report birth therein.

222. The head for the time being of every house or family in which any birth occurs, shall, within eight days after the event, report the same to the Cantonment Magistrate, together with the following particulars, namely :—

(*a*) the date of the birth, and the sex and name (if any), of the child ;
(*b*) the name, place of residence and occupation, and the caste or religion (if any), of the father, if the person making the report is willing to furnish these particulars ; and
(*c*) the name and place of residence of the person making the report.

Duty of head of house or family to report death therein.

223. The head for the time being of every house or family in which any death occurs, shall, within twenty-four hours after the event, report the same to the Cantonment Magistrate, together with the following particulars, namely :—

(*a*) the date of the death, the sex, name, age and occupation, and the caste or religion (if any), of the deceased, the cause of death, and the place of residence of the deceased at the time of death ;
(*b*) the name of the father, or, if the deceased was a married woman, the name of her husband, if the person making the report is willing to furnish these particulars ; and
(*c*) the name and place of residence of the person making the report.

Duty of Medical Officers to report births and deaths.

224. It shall be the duty of every Medical Officer of the Government to report to the Cantonment Magistrate, as soon as practicable after the event, every birth and death occurring in the cantonment of which he may become cognizant in the exercise of his profession.

Penalty.

225. Whoever fails to comply with the provisions of section 222 or section 223, shall be punishable with fine which may extend to five rupees.

CHAPTER XVI.

Appointment of Agents by absentee Owners.

Duty of absentee owner to appoint agent.

226. (1) Whoever, being the owner of any building or land in the cantonment, is absent therefrom, shall appoint some person residing in or near the cantonment to act as his agent for all the purposes of the Cantonments Act, 1889, and of this Code, and shall notify such appointment to the Canton Magistrate.

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(2) Whoever fails to appoint an agent as required by sub-section (1), shall be punishable with fine which may extend to twenty rupees, and, in the case of a continuing failure, with an additional fine not exceeding five rupees for every day after the first in regard to which he is convicted of having persisted in the failure.

Relief to agents and trustees.

227. (1) Where any person, by reason of his receiving the rent of immoveable property as agent or trustee, or of his being as agent or trustee the person who would receive the rent if the property were let to a tenant, would, under any of the provisions of this Code, be bound to discharge any obligation imposed on the owner of the property for the discharge of which money is required, he shall not be bound to discharge the obligation unless he has, or but for his own improper act or default might have had, in his hands funds sufficient for the purpose belonging to the owner.

(2) The burden of proof of the facts entitling an agent or trustee to relief under sub-section (1) shall lie on him.

(3) Where any agent or trustee has claimed and established his right to relief under this section, the cantonment authority may, by notice in writing, require him to apply to the discharge of such obligation as aforesaid the first moneys which shall come to his hands on behalf, or for the use, of the owner; and, on failure to comply with the notice, he shall be deemed to be personally liable to discharge the obligation.

CHAPTER XVII.

Inspection, Entry, Search and Arrest.

Inspection, Entry and Search.

Entry and inspection by the General Officer of the Command, the Officer Commanding the District or the District Magistrate.

228. The General Officer of the Command, the Officer Commanding the District or the District Magistrate may enter into or on, and inspect, any building or land, if it appears to him to be necessary to do so in order to the exercise of any power conferred upon him by this Code.

Entry and inspection by, or by the authority of, the cantonment authority.

229. The cantonment authority, by itself or by any person generally or specially authorized by it in this behalf, may—

(*a*) enter into, or on, any building or land for the purpose of—

(i) removing any buildings or materials, or altering any building, in pursuance of a notice issued by the cantonment authority in accordance with the conditions of a lease executed under section 259; or

(ii) resuming any land in pursuance of a notice issued by the Local Government in accordance with the conditions of a lease executed as aforesaid; or

(iii) performing any act authorized by any of the provisions of sections 93, 94 and 285, sub-section (1); or

(iv) making any inspection authorized by the provisions of section 81, sub-section (1); or

(*b*) enter into and inspect any place which is, or may recently have been, used as a burial or burning ground, if it appears to the cantonment authority to be desirable to do so in order to the carrying out of any of the provisions of this Code; or

(*c*) enter into, or on, and inspect, any building or land in, on, or with respect to which the cantonment authority has reason to believe—

(i) that a breach of any of the provisions of this Code has been committed; or

(ii) that any notice issued under this Code has not been duly complied with; or

(iii) that any conditions imposed under this Code have not been duly observed; or

(iv) that any notice should be issued under this Code ; or

(v) that any conditions should be imposed under the provisions of section 109, sub-section (2), section 143, sub-section (2), or section 168.

Entry, inspection and search by, or by the authority of, the Sanitary Officer.

230. The Sanitary Officer, by himself or by any Medical Officer of the Government specially deputed by him by an order in writing in this behalf, may—

(*a*) enter into or on any building or land for the purpose of inspecting any receptacles or places provided under section 74 for the temporary deposit of offensive matter and rubbish ; or

(*b*) enter into, and inspect, any dairy, or any place at which a washerman washes or keeps clothes or other articles in the course of his business, if it appears to the Sanitary Officer to be necessary to do so in order to the prevention of the spread of any infectious or contagious disorder ; or

(*c*) enter into or on, and inspect, any building or land in or on which the Sanitary Officer has reason to believe that there is, or has recently been, any person suffering, or the corpse of any person who has died, from any infectious or contagious disorder, and search for infected persons, corpses or articles therein or thereon ; or

(*d*) enter into or on any building or land in or on which the Sanitary Officer has reason to believe that there is any public conveyance which has been used for the carriage of a person suffering, or the corpse of a person who has died, from any infectious or contagious disorder, and which has not been disinfected ; or

(*e*) enter into or on, and inspect, any building or land in, on or with respect to which the Sanitary Officer has reason to believe—

(i) that any such nuisance as is described in section 66, clause (*d*), clause (*e*), clause (*o*) or clause (*p*), has been committed, or

(ii) that a breach of any of the provisions of sections 105, 121, 127, 145 to 149, 156, 170 to 173 and 192 has been committed, or

(iii) that any notice issued under section 186, section 191 or section 193 has not been duly compiled with, or

(iv) that any conditions imposed under section 143, sub-section (2), or section 168, and affecting sanitation or hygiene, have not been duly observed, or

(v) that the cantonment authority should be moved to issue a notice under section 76, 79, 80, 82, 83, 84, 99, 101, 102, 154, 155, 157, 160, 162, 164, 187 or 194, or to take any action under section 81, sub-section (1) ; or

(*f*) enter into and inspect any private slaughter-house, or any structure therein, for the purpose of assisting the Cantonment Magistrate in determining whether a licence should be issued under section 124 ; or

(*g*) enter on and inspect any land which it is proposed to use as a burial or burning ground, for the purpose of ascertaining whether any such permission as is referred to in section 143, sub-section (1), should be given ; or

(*h*) enter into or on, and inspect, any building or land for the purpose of advising the cantonment authority as to the conditions which should be imposed under section 168 in any license which it is proposed to grant under section 167 ; or

(*i*) enter into or on, and inspect, any building or land in or on which the Sanitary Officer has reason to believe that there is any animal or flesh which has been brought into the cantonment in contravention of section 132, and search for such animal or flesh ; or

(*j*) enter into or on, and inspect, any building or land, for the purpose of—

(i) ascertaining whether the General Officer of the Command should be moved to take any action under section 178, sub-section (1), or

(ii) advising the cantonment authority whether any, and, if so, what, directions should be issued under section 89, sub-section (1), clause (*b*), clause (*c*) or clause (*d*) ; or

(*k*) enter into or on, and inspect, any building or land with respect to which the Sanitary Officer has reason to believe that the Cantonment Authority should be moved to issue a notice under section 77, section 83, section 84 or section 95.

Entry, inspection and search by, or by the authority of, the Cantonment Magistrate.

231. The Cantonment Magistrate, by himself or by any person generally or specially authorized by him in this behalf, may—

(*a*) enter into or on, and inspect, any building or land for the purpose of—

(i) inquiring into occupation, ownership, agency, rights or any other matter required to be entered in any of the registers maintained under sections 266, 267 and 268, or

(ii) performing the duties imposed on the Cantonment Magistrate by section 17, sub-section (2), section 68, section 71, or section 76, clause (*c*), sub-clause (i), or

(iii) determining whether a license should be issued under section 114 or section 124, or

(iv) ascertaining whether a notice should be issued under section 182 or section 186, or

(v) cleansing or disinfecting a building or any articles therein, or renewing flooring in pursuance of the proviso to section 186 ; or

(*b*) enter into or on, and inspect, any building or land in or on which the Cantonment Magistrate has reason to believe that there is the corpse of any person who has died from an infectious or contagious disorder, and search for such corpse ; or

(*c*) enter into and inspect any building which is being used, or is intended to be used, as a theatre or place of public entertainment or resort or any structure therein, for the purpose of enquiring into and testing the safety of such building or structure ; or

(*d*) enter into or on, and inspect, any building or land in or on which the Cantonment Magistrate has reason to believe that there is any animal or flesh which has been brought into the cantonment in contravention of section 132, and search for such animal or flesh ; or

(*e*) enter any building in order to enforce its surrender in pursuance of the conditions of a lease executed under section 259.

Entry into, and inspection of, markets by Sanitary Officer or Cantonment Magistrate.

232. The Cantonment Magistrate or the Sanitary Officer may enter into any market, or any structure therein, and inspect the same or any article therein, in the performance of the duty imposed upon him by section 112.

Entry by public conservancy establishments.

233. Where the cantonment authority has, under section 78, sub-section (1), provided for the performance by its agents of the duties usually performed by sweepers in respect of any building or land, or of any privy, drain, cesspool or other receptacle for offensive matter pertaining to any building or land, the persons employed by it to perform such duties may enter into or on the building or land for the purpose of performing their duties.

Time of entry.

234. (1) Every entry made under any of the foregoing sections 228 to 232 shall be made between sunrise and sunset :

Provided that, if in any such case the authority empowered by any of the said sections to make or authorise an entry thinks it necessary, in the interests of the public health or safety, that entry should be made at any other time, he or it may, for reasons to be recorded in writing, make such entry, or authorize it to be made, at any reasonable time between sunset and sunrise.

(2) Any entry made under section 233 may be made at any reasonable time.

Precautions to be observed in entering dwelling.

235. When any building used as a human dwelling is entered under this Chapter, due regard shall be paid to the social and religious sentiments of the occupiers ; and no apartment in the actual occupancy of a woman shall be entered under this Chapter until she has been informed that she is at liberty

to withdraw and every reasonable facility has been afforded to her for withdrawing.

Precaution to be observed in entering and inspecting burial or burning ground.

236. Every entry and inspection made under section 229, clause (*b*), shall be made under such arrangements as shall ensure due regard for the religious feelings of the community concerned.

Arrest without Warrant.

Arrest by police without warrant.

237. Any member of the police-force employed in the cantonment may, without a warrant, arrest any person committing in his view a breach of any of the provisions of this Code specified in the first column of Schedule HI :

Provided, first, that in the case of the breach of any such provision as is specified in Part B of the said schedule, no person shall be so arrested whose name and address are known to either the complainant or the arresting officer :

Provided, secondly, that no person shall be so arrested who consents to give his name and address, unless there is reasonable ground for doubting the accuracy of the name or address so given, the burden of proof of which shall lie on the arresting officer :

Provided, thirdly, that no person so arrested shall be detained after his name and address have been ascertained :

Provided, fourthly, that no person so arrested shall, except under the order of a Magistrate, be detained longer than may be necessary for bringing him before a Magistrate : and

Provided, fifthly, that no person shall be so arrested for a breach of the provisions of section 209, except—

(*a*) at the request of the person importuned or of an officer, as defined in the Cantonments Act, 1889, in whose presence the breach was committed ; or

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(*b*) by, or at the request of, a member of the British military police-force employed in the cantonment and specially authorized in this behalf by the Commanding Officer of the cantonment, in whose presence the breach was committed.

CHAPTER XVIII.

SERVICE OF SUMMONSES, NOTICES, ETC.

Service of summonses, notices, requisitions and other documents.

238. (1) Unless it is in this Code in any case otherwise expressly provided, any summons, notice, requisition or other document issued thereunder may be served by being delivered to the person to whom it is addressed, or by being left at his usual place of abode or business with some adult male member or servant of his family, or, if it cannot be so served, may be affixed on some conspicuous part of his usual place of abode or business.

(2) Where the usual place of abode or business of the person to whom the summons, notice, requisition or document is addressed, is not in the cantonment, it may be served by posting it in a registered cover addressed to his usual place of abode or business.

(3) Where the usual place of abode or business of the owner of any property is not known, any such summons, notice. requisition or document addressed to him as such owner may be served on the occupier.

(4) Where the usual place of abode or business of the occupier of any property is not known, any such summons, notice, requisition or document addressed to him as such occupier may be served by affixing it on some conspicuous part of the property.

Service on agent of absentee owner.

239. The service of a summons, notice, requisition or other document as aforesaid on any agent appointed by an absentee owner shall be deemed to be service on the owner.

CHAPTER XIX.

APPEAL AND REVISION.

Appeals from executive orders when allowed and to whom to lie.

240. (1) Any person aggrieved by any of the executive orders described in the second column of Schedule IV may appeal to the authority specified in that behalf in the third column of the said schedule.

(2) No such appeal shall be admitted unless made within the period specified in that behalf in the fourth column of the said schedule.

(3) The period specified as aforesaid as the time allowed for making an appeal shall be computed in accordance with the provisions of the Indian Limitation Act, 1877, with respect to the computation of the period of limitation thereunder. XV of 1877.

Petition of appeal.

241. (1) Every appeal under this Code shall be made by petition in writing, accompanied by a copy of the order appealed against.

(2) Any such petition as aforesaid may be presented to the authority which made the order appealed against; and that authority shall be bound to forward it to the appellate authority, and may attach thereto any report which it may desire to make by way of explanation.

(3) Where any such petition as aforesaid is presented direct to the appellate authority and an immediate order thereon is not necessary, the appellate authority may refer the petition for report to the authority which made the order appealed against.

Suspension of action pending appeal.

242. On the admission of an appeal from any order, other than an order contained in a notice issued under—

(*a*) section 76, clause (*d*), clause (*e*) or clause (*g*),
(*b*) section 77,
(*c*) section 83,
(*d*) section 93,
(*e*) section 155,
(*f*) section 157, clause (*a*),
(*g*) section 204, sub-section (1),
(*h*) section 210, sub-section (3), or
(*i*) section 211,

all proceedings to enforce the order and all prosecutions for any breach thereof shall be held in abeyance pending the decision of the appeal, and, if the order is set aside on appeal, disobedience thereto shall not be deemed to be an offence.

Review.

243. (1) Where an appeal from an order made by the Cantonment Magistrate dismissing, under section 21, a servant of the cantonment authority whose salary is not less than one hundred rupees a month, has been disposed of by the General Officer of the Command, the servant so dismissed, if he is dissatisfied with the decision of the General Officer of the Command, may, within thirty days from the date thereof, apply to the Governor General in Council for a review of that decision.

(2) Where an appeal from an order made by the cantonment authority has been disposed of by the District Magistrate, the cantonment authority, if it is dissatisfied with the decision of the District Magistrate, may, within thirty days from the date thereof, apply, through the General Officer of the Command, to the Local Government, or to such authority as the Local Government may appoint in this behalf, for a review of that decision.

(3) The provisions of this Chapter with respect to appeals shall apply, so far as may be, to applications for review made under this section.

Finality of appellate orders.

244. Save as otherwise provided in section 243, the order of the appellate authority confirming, setting aside or modifying an order appealed against shall be final:

Provided that no order shall be confirmed, set aside or modified on appeal unless and until the appellant has had a reasonable opportunity of being heard.

CHAPTER XX.

Committees of Arbitration.

Obligation of Commanding Officer of cantonment to convene a committee of arbitration to decide question as to rent or repairs.

245. On a requisition being made to him under Condition XVIII or Condition XIX set forth in a lease executed under section 259 in Form B in Schedule V, within the period mentioned in such Condition, the Commanding Officer of the cantonment shall forthwith proceed to convene a committee of arbitration—

(*a*) to determine the amount of monthly rent to be paid ; or

(*b*) to determine whether any, and, if so, what, repairs are necessary, and the extent to which they are necessary.

Discretion of Commanding Officer of cantonment to convene a committee of arbitration to decide question as to condition of house or as to rent or repairs.

246. (1) On an application being made to him under Condition XX or Condition XXI set forth in a lease executed under section 259 in Form B in Schedule V, the Commanding Officer of the cantonment may, after such inquiry as he may think fit to make, proceed to convene a committee of arbitration—

(*a*) to determine whether the house has become unfit for occupation ; or

(*b*) to determine the amount of monthly rent to be paid ; or

(*c*) to determine whether any, and, if so, what, repairs are necessary, and the extent to which they are necessary ; or

(*d*) otherwise to determine the question in dispute.

(2) In the exercise of the discretion vested in him by this section, the Commanding Officer of the cantonment may refuse to convene a committee of arbitration on the ground that the application therefor is groundless or frivolous, or for any other sufficient reason.

Obligation of Commanding Officer of cantonment to convene a committee of arbitration to determine amount of compensation payable.

247. Where the cantonment authority and the person or persons concerned are unable to agree as to the amount of any compensation payable under the first proviso to section 81, sub-section (3), or under proviso (*c*) to section 101, sub-section (1), the Commanding Officer of the cantonment shall proceed to convene a committee of arbitration to determine the amount payable.

Procedure for convening committee of arbitration.

248. (1) Where a committee of arbitration is to be convened, the Commanding Officer of the cantonment shall cause an order to be published in Station Orders, stating the matter to be determined by the committee of arbitration.

(2) The Cantonment Magistrate shall send a copy of the order published under sub-section (1) to the District Magistrate and to the parties concerned, and shall, by notice in writing, require the parties to nominate members of the committee of arbitration as hereinafter provided.

Composition of committee of arbitration convened under section 245 or 246.

249. Every committee of arbitration convened under section 245 or 246 shall consist of—

(*a*) the District Magistrate or, if it is inconvenient for him to act, some Magistrate, being a Justice of the Peace, appointed by him to act in his stead ;

(*b*) a member to be nominated by the officer concerned ; and

(*c*) a member to be nominated by the lessee :

Provided that if such officer or lessee as aforesaid fails to nominate a member within seven clear days from the date on which he is called upon to do so, or if any member who has been nominated, neglects or refuses to act and such officer or lessee, as the case may be, fails to nominate, within seven clear days from the date on which he is called upon to do so, another member who is willing to act, the Commanding Officer of the cantonment shall forthwith appoint a member in the place of such nominee.

Composition of committee of arbitration convened under section 247.

250. Every committee of arbitration convened under section 247 shall consist of—

(*a*) the District Magistrate or, if it is inconvenient for him to act, some Magistrate, being a Justice of the Peace, appointed by him to act in his stead ;

(*b*) a member to be nominated by the person or persons concerned ; and

(*c*) a member to be nominated by the cantonment authority :

Provided that, if such person or persons concerned as aforesaid fails or fail to nominate a member within seven clear days from the date on which he or they is or are called upon to do so, or if any member who has been nominated by such person or persons, neglects or refuses to act and such person or persons fails or fail to nominate, within seven clear days from the date on which he or they is or are called upon to do so, another member who is willing to act, the Commanding Officer of the cantonment shall forthwith appoint a member in the place of such nominee.

Members of committee of arbitration to be persons who are not personally interested, and whose services are immediately available.

251. No person shall be nominated or appointed a member of a committee of arbitration unless he is personally disinterested in the matter under reference and his services are immediately available for the purposes of the arbitration ; and the nomination of any person who is, in the opinion of the Commanding Officer of the cantonment, personally interested in the matter under reference, or whose services are not immediately available as aforesaid, shall be deemed to constitute a failure to make a nomination within the meaning of the foregoing provisions.

Assembly of committee of arbitration.

252. When a committee of arbitration has been duly constituted, the Cantonment Magistrate shall, by notice in writing, inform each of the members of the fact, and the committee of arbitration shall assemble within seven clear days from the service of the notice.

Chairman of committee of arbitration.

253. The District Magistrate or the Magistrate appointed by him to act in his stead shall be the chairman of every committee of arbitration.

Calculation of rent by committee of arbitration.

254. For the purpose of determining the amount of monthly rent to be paid for a house, every committee of arbitration shall estimate, as nearly as may be, the market-value of all buildings and authorized additions ; and the amount of rent determined upon shall be such percentage on such market-value as the committee of arbitration may think reasonable with reference to the circumstances of the neighbourhood and the period of time and season for which the house is likely to be occupied during the year, and shall include the taxes (if any) levied upon the land, or such proportion thereof as the committee of arbitration may find to be customarily paid for the time being in the neighbourhood by tenants.

Decision of committee of arbitration to be by vote and final.

255. (1) The decision of every committee of arbitration shall be determined by the majority of the votes taken at a meeting at which all the members are present.

(2) The decision of every committee of arbitration shall be final.

CHAPTER XXI.

Applications for Building-sites on Government Land in Cantonments.

Applications for permission to occupy Government land for building-sites.

256. Every application for permission to occupy, for the purposes of a building-site, land belonging to the Government in a cantonment shall be submitted to the Cantonment Magistrate in writing, and shall contain the following particulars, namely :—

(*a*) the situation, area and boundaries of the land ;

(*b*) the materials to be used in the intended buildings ;

(*c*) the period after the date of occupation within which the intended buildings are to be completed ; and

(*d*) the purposes for which the land and the intended buildings are to be used.

Documents to accompany applications.

257. Every application made under section 256 shall be accompanied by—

(*a*) a plan, on a scale of fifty feet to the inch, showing—

(i) the boundaries of the land,

(ii) the roads or lands adjoining, and

(iii) all buildings intended to be erected on the land ;

(*b*) a ground plan and elevation of the principal building intended to be erected, showing the dimensions of the same ;

(*c*) a statement of the buildings intended to be erected ;

(*d*) an approximate statement of the intended outlay on the buildings and of the rent which it is proposed to charge for the same, if let to a tenant ; and

(*e*) a declaration that the applicant has read the appropriate form of lease referred to in section 259 and undertakes, in the event of his application being sanctioned, to execute a lease in that form.

Disposal of such applications.

258. (1) Every application made under section 256 shall, if the procedure prescribed by that section and section 257 has been duly observed, be referred by the Cantonment Magistrate to the Executive Engineer—

(*a*) for verification of the plan referred to in section 257, clause (*a*) ; and

(*b*) for report as to whether the land is in the vicinity of a fortified place, whether the land is, in the opinion of the Executive Engineer, likely to be required for any public purpose, and whether there is any departmental objection to the application being sanctioned.

(2) On receipt of such verification and report as aforesaid, the application shall be submitted to the Commanding Officer of the cantonment.

(3) Where the land is not situate in a bazar, if the Commanding Officer of the cantonment considers that its occupation in the manner proposed would not be objectionable, either as regards the health or comfort of the troops or in any other respect, he shall attach to the application a certificate to that effect, and shall forward the application to the General Officer of the Command :

Provided that, where the Commanding Officer of the cantonment is not the Officer Commanding the District, the application shall be forwarded to the Officer Commanding the District, who shall, unless he considers that the occupation of the land in the manner proposed would be objectionable as aforesaid, forward the application to the General Officer of the Command.

(4) Where the land is situate in a bazar and there is a cantonment committee, if the Commanding Officer of the cantonment considers that the occupation of the land in the manner proposed would not be objectionable as aforesaid, he shall attach to the application a certificate to that effect, and shall forward the application to the cantonment committee.

(5) The General Officer of the Command, the Commanding Officer of the cantonment or the cantonment committee, as the case may be, may sanction or reject the application, according as he or it may think fit :

Provided, first, that, if the land is in the vicinity of a fortified place or is applied for by a railway company, the application shall not be sanctioned without the express orders of the Governor General in Council, obtained through such channel as the Governor General in Council may direct : and

Provided, secondly, that if the land is applied for for the purpose of erecting a hospital, school or other public building, or if it is intended to set apart for occupation by civil officers the house to be erected on the land, the application shall not be sanctioned without the concurrence of the Local Government.

Execution of lease, with site-plan annexed.

259. (1) When an application under this Chapter is sanctioned, the applicant, before using or occupying the land or erecting any building thereon, shall duly execute a lease in one of the forms indicated in Schedule V and subject to the conditions set forth in the annexure to such form, or in such other form as the

Governor General in Council may, by notification, prescribe, and shall register the lease under the law for the time being in force relating to the registration of documents.

Explanation.—Form A in Schedule V shall be applicable to leases of land applied for by a railway company, or for the purpose of erecting a hospital, school or other public building, and to leases of land situate in a bazar. Form B shall be applicable to all other leases of land under this Chapter.

(2) There shall be appended to the lease a site-plan of the land, on a scale of fifty feet to the inch, showing—

(*a*) the boundaries of the land ;

(*b*) the roads or lands adjoining ; and

(*c*) all buildings authorized to be erected on the land.

(3) The site-plan shall be verified by the Executive Engineer, and shall be signed,—

(*a*) if the land is situate in a bazar, by the Cantonment Magistrate ;

(*b*) if the land is not situate in a bazar, by the Officer Commanding the District or his principal staff officer,

and shall be indorsed with the date of its preparation, the name of the lessee, and a note specifying the period within which the buildings to be erected on the land are to be completed.

(4) Two copies of the site-plan, prepared at the cost of the lessee and verified by the Executive Engineer, shall be delivered by the lessee to the Cantonment Magistrate.

Record of copies of leases and site-plans.

260. (1) The Cantonment Magistrate shall cause to be prepared, and shall authenticate with his signature, two copies of every lease executed under this Chapter.

(2) The Cantonment Magistrate shall—

(*a*) record in his office one of the said copies of every such lease as aforesaid and one of the copies of every site-plan delivered to him by the lessee under the terms thereof ; and

(*b*) forward the other copies of every such lease and site-plan as aforesaid to the head-quarters of the Command for record.

CHAPTER XXII.

Registration of Immoveable Property in Cantonments.

General plan.

261. The cantonment authority shall prepare and maintain a general plan of the cantonment, on a scale of twenty-four inches to the mile, showing all necessary details and distinguishing in particular—

(*a*) all houses (if any) which have been set apart, in accordance with the conditions of leases executed under section 259, for occupation by civil officers ; and

(*b*) all land (if any) which does not belong to the Government, and all houses (if any) situate thereon.

Bazar plan.

262. The cantonment authority shall also prepare and maintain a bazar plan, on a scale of fifty feet to the inch, of every bazar in the cantonment.

Sites and streets to be distinguished.

263. (1) Every site shall be shown under a distinguishing number on the plans prepared under this Chapter, and the numbers for each bazar shall form a separate series.

(2) Every street shall be shown on such plans as aforesaid by its name or under an alphabetical letter or number.

Dating and authentication of plans.

264. (1) Every plan prepared under this Chapter shall, on completion, be dated and authenticated by the signature of the Executive Engineer.

(2) Whenever a general plan prepared under section 261 is altered, the alteration shall be explained on the plan in a memorandum dated and signed by the Executive Engineer.

Plans not to be destroyed without sanction.

265. No plan which relates to land in a cantonment and is in the custody of the cantonment authority or of any public officer, other than a plan submitted with an application under Chapter XXI, shall be destroyed without the previous sanction of the Governor General in Council.

Register of Government land held by lessees outside bazars.

266. The Cantonment Magistrate shall maintain a register showing, in regard to all Government land held by lessees and not situate in a bazar (whether the sites were occupied by the lessees before or after the commencement of this Code) and the buildings situate thereon, the following particulars, so far as they can be ascertained, namely :—

(*a*) the name of the cantonment, and the number and date of any orders declaring it to be a cantonment or defining its limits ;
(*b*) a reference to any similar register kept before the commencement of this Code ;
(*c*) the date of registry of the site ;
(*d*) the number of the site, as shown on the general plan maintained under section 261 ;
(*e*) the dimensions of the site ;
(*f*) the boundaries of the site ;
(*g*) in the case of a site occupied before the commencement of this Code, the date of the permission to occupy the site, and, in the case of a site occupied after the commencement of this Code, the date of the lease executed by the lessee under section 259 ;
(*h*) the name and description of the lessee at the date of registry ;
(*i*) the name and description of the lessee's agent (if any) at the date of registry ;
(*j*) the nature of the lessee's right under this Code, or under any other provision of law, including the particulars of any special right of occupancy ;
(*k*) the estimated value of buildings on the site at the date of registry ;
(*l*) the dates of authorities to add to buildings ; and
(*m*) all changes occurring from time to time, whether by transfer, by alterations or additions, by decisions of committees of arbitration, in dimensions, in value, or in agency.

Explanation.—In this section, the expression "date of registry" means the date of entry in the register maintained hereunder.

Register of Government land held by lessees in bazars.

267. The Cantonment Magistrate shall maintain a register showing, in regard to all Government land held by lessees and situate in a bazar (whether the sites were occupied by the lessees before or after the commencement of this Code) and the buildings situate thereon, the following particulars, so far as they can be ascertained, namely :—

(*a*) the name of the bazar ;
(*b*) a reference to any similar register kept before the commencement of this Code ;
(*c*) the date of registry of the site ;
(*d*) the number of the site, as shewn on the bazar plan maintained under section 262 ;
(*e*) the dimensions of the site ;
(*f*) the boundaries of the site ;
(*g*) in the case of a site occupied before the commencement of this Code, the date of the permission to occupy the site, and, in the case of a site occupied after the commencement of this Code, the date of the lease executed by the lessee under section 259 ;
(*h*) the name and description of the lessee at the date of registry ;
(*i*) the name and description of the lessee's agent (if any) at the date of registry ;
(*j*) the estimated value of buildings on the site at the date of registry ; and
(*k*) all changes occurring from time to time, whether by transfer, by alterations or additions, in dimensions, in value, or in agency.

Explanation.—In this section, the expression "date of registry" means the date of entry in the register maintained hereunder.

Register of private land.

268. The Cantonment Magistrate shall maintain a register showing, in regard to all land (if any) which is private property, and the buildings situate thereon, the following particulars, so far as they can be ascertained, namely :—

(*a*) the name of the cantonment, and the number and date of any orders declaring it to be a cantonment or defining its limits ;

(*b*) a reference to any similar register kept before the commencement of this Code ;

(*c*) the date of registry of the site ;

(*d*) the number of the site as shown on the general plan ;

(*e*) the dimensions of the site ;

(*f*) the boundaries of the site ;

(*g*) the name and description of the owner at the date of registry ;

(*h*) the name and description of the owner's agent (if any) at the date of registry ;

(*i*) the particulars of the owner's right by reference to any acknowledgment by the Government, or any other proof ;

(*j*) the estimated value of buildings on the site at the date of registry ; and

(*k*) all changes occurring from time to time, whether by transfer, by alterations or additions, in dimensions, in value or in agency.

Explanation.—In this section the expression "date of registry" means the date of entry in the register maintained hereunder.

Register of transfers.

269. (1) The Cantonment Magistrate shall maintain a register of transfers, in which he shall from time to time enter references to all transfers of immoveable property—

(*a*) registered in his own office, where he is himself Registrar or Sub-Registrar of the cantonment under the Indian Registration Act, 1877, or III of 1877.

(*b*) appearing in the copies forwarded to him by the Registrar of the district under section 32, sub-section (2), of the Cantonments Act, 1889, XIII of 1889.

as the case may be.

(2) The register of transfers shall contain the following particulars, namely :—

(*a*) a serial number for each transfer ;

(*b*) the date of registry ;

(*c*) the distinguishing number of the site, as recorded in the register maintained under section 266, 267 or 268, as the case may be ;

(*d*) the name of the transferor ;

(*e*) the name of the transferee ;

(*f*) the nature of the transfer, that is to say, whether by sale, mortgage, gift, exchange or bequest ;

(*g*) the date of the transfer ; and,

(*h*) where the cantonment has been constituted a district or sub-district for the purposes of the Indian Registration Act, 1877, references to the Indexes Nos. I, II and III kept in the cantonment under sections 54 and 55 of that Act. III of 1877.

Explanation.—In this section the expression "date of registry" means the date of entry in the register maintained hereunder.

Reference in other registers, to the register of transfers.

270. Reference, when possible, to the serial number in the register of transfers shall be sufficient record, in the registers maintained under sections 266, 267 and 268, respectively, of changes occurring by transfer.

Annual inspection of registers.

271. (1) The cantonment authority shall, in the month of July in each year, make an inspection of the registers maintained under sections 266, 267 and 268 respectively, and shall ascertain—

(*a*) whether all the changes referred to in section 266, clause (*m*), or in section 268, clause (*k*), which have taken place during the last preceding twelve months, have been duly noted in the appropriate register, and

(*b*) where any of the said registers are in such a condition as to require renewal.

(2) The cantonment authority may give such directions as it thinks fit after making an inspection under sub-section (1); and shall send a brief report to the Officer Commanding the District of any action taken by it under this section.

CHAPTER XXIII.

SUPPLEMENTAL.

Bye-laws.

Additional power of cantonment committee to make bye-laws in hill cantonments.

272. The cantonment committee (if any) of a contonment wholly or in part situated in a hilly tract may, at a meeting of which at least six clear days' notice shall have been given, make bye-laws for regulating or prohibiting the cutting or destroying of trees or shrubs, or the making of excavations or removal of soil or quarrying, where such regulation or prohibition appears to the cantonment committee to be necessary for the maintenance of a water-supply, the preservation of the soil, the prevention of landslips or of the formation of ravines or torrents, or the protection of land against erosion or the deposit thereon of sand, gravel or stones.

Penalty for infringement of bye-laws.

273. (1) In making a bye-law under section 169 or section 272, the cantonment committee may direct that a breach of it shall be punishable with fine which may extend to fifty rupees, and, in the case of a continuing breach, with a further fine not exceeding five rupees for every day after the first in regard to which the offender is convicted of having persisted in the breach.

(2) In lieu of or in addition to such fine as aforesaid, the Magistrate may require the offender to remedy the mischief so far as it lies within his power to do so.

Confirmation of bye-laws.

274. (1) No bye-law made under section 169 or section 272 shall come into force until it has been confirmed by the Local Government and published for such time and in such manner as the Local Government may prescribe in this behalf.

(2) The Local Government may cancel its confirmation of any such bye-law, and thereupon the same shall cease to have effect.

Procedure in making bye-laws.

275 (1) The cantonment committee shall, before making any bye-laws under section 169 or section 272, publish, in such manner, as may, in its opinion, be sufficient for giving information to persons interested, a draft of the proposed bye-laws, with a notice specifying a date on or after which the draft will be taken into consideration, and shall, before making such bye-laws, consider any objection or any suggestion which may be received from any person with respect to the draft before the date so specified.

(2) If, on such consideration of the draft, any modification is made, the Local Government shall determine whether or not the draft shall be republished for further criticism under this section.

(3) Every bye-law made by the cantonment committee shall be notified in English and in such other language or languages as the Local Government may direct; and such notification shall be conclusive proof that such bye-law has been duly made in accordance with the requirements of this section.

Delegation of Functions.

Delegation of functions of Cantonment Magistrate.

276. (1) With the previous sanction of the Governor General in Council, the Local Government may, by order published in the local official Gazette, authorize any person mentioned in such order to discharge any of the functions imposed by this Code on the Cantonment Magistrate, except those imposed by Chapter XXI:

Provided, first, that a person so authorized shall discharge such of the said functions only as the Cantonment Magistrate may, by order in writing, assign to him ; and

Provided, secondly, that the Cantonment Magistrate may, by a like order, resume any functions which he may have so assigned.

(2) In the discharge of any functions so assigned to him, such persons as aforesaid shall, under the control of the Cantonment Magistrate, have the same powers and responsibilities as the Cantonment Magistrate.

Delegation of functions of General Officer of the Command.

277. With the previous sanction of the Governor-General in Council, the General Officer of the Command may, by notification in Command Orders, delegate any of his functions under this Code to any officer named in such notification ; and may, in like manner, vary or rescind any notification so made.

Delegation of cantonment committee's functions to sub-committees.

278. (1) The cantonment committee may, by order in writing, delegate any of its functions to a sub-committee consisting of any two or more of the members of the cantonment committee.

(2) Every order passed by a sub-committee appointed under sub-section (1) shall have the same effect as an order of the cantonment committee :

Provided that the cantonment committee may, in any particular case, require that an order so passed be submitted to it for confirmation before issue.

Notices.

Notice to fix reasonable time for doing act required.

279. Where any notice issued under any section of this Code requires an act to be done for which no time is fixed by such section, the notice shall specify a reasonable time for doing the same ; and it shall rest with the Court to determine whether the time so specified was a reasonable time within the meaning of this section.

Notices to whom to be given.

280. Where it is provided by this Code that a notice may be given to the owner, lessee or occupier of any land or building, and the owner or lessee and the occupier are different persons, the notice shall be given to the one of them primarily liable to comply with such notice, and, in case of doubt, to both of them.

Provided that, where there is no owner or lessee resident in the cantonment. the delivery of the notice to the occupier shall be sufficient.

Authentication and validity of notices issued by cantonment authority.

281. Every notice issued by the cantonment authority under this Code shall be signed—

(*a*) by the President or Secretary of the cantonment committee (if any) ; or

(*b*) by the members of any sub-committee specially authorised by the cantonment committee (if any) in this behalf ; or

(*c*) if a cantonment committee has not been constituted or has ceased to exist or cannot be convened, by the Commanding Officer of the cantonment.

Publication of public notices.

282. (1) Unless it is in this Code in any case otherwise expressly provided, every public notice issued thereunder shall be published by proclamation or in such other manner as the Local Government may direct.

(2) Such proclamation as aforesaid shall be made by such method as the authority issuing the notice, or the Cantonment Magistrate, may deem to be the customary method.

Penalties and Prosecutions.

Penalties.

283. (1) Whoever, in any case in which a penalty is not expressly provided elsewhere in this Code, fails to comply with any notice thereunder or otherwise commits a breach of any of the

provisions thereof, shall be punishable with imprisonment for a term which may extend to eight days, or with fine which may extend to fifty rupees, and, in the case of a continuing breach, with an additional fine not exceeding five rupees for every day after the first in regard to which he is convicted of having persisted in the breach.

(2) In lieu of, or in addition to, any fine imposed under this Code, the Court may require the offender to remedy, so far as it lies within his power to do so, any mischief in respect of which the fine is imposed.

Limitation of prosecutions.

284. No person shall be liable to punishment for a breach of any of the provisions of this Code, unless complaint of the breach is made within three months after the commission thereof before a Magistrate having jurisdiction to entertain the complaint.

Miscellaneous.

Execution in case of failure and recovery of cost thereof.

285. (1) Where any person fails to perform any act which he has, by a notice issued under this Code, been required to perform, the cantonment authority may cause the act to be performed and may recover the cost from him.

(2) Any moneys recoverable by the cantonment authority under sub-section (1) may be recovered either by suit or, on application to a Magistrate having jurisdiction in the cantonment, by distress or sale of the moveable property of the person from whom the money is recoverable, and, if recoverable from the owner of property, shall, until it is paid, be a charge on the property.

Verification of weights and measures.

286. (1) The cantonment authority shall maintain such standards as it thinks fit for the purpose of verifying weights and measures, and shall provide proper means—

(*a*) for verifying weights and measures in use in the cantonment by comparison with such standards as aforesaid, and

(*b*) for stamping weights and measures so verified.

(2) The cantonment authority may, by public notice, fix the times and places at which a servant of the cantonment authority shall attend for the purpose of such verification as aforesaid.

Compensation for damage resulting from exercise of powers under this Code.

287. (1) The cantonment authority may, in any case not otherwise provided for, make compensation out of the cantonment fund to any person sustaining any damage by reason of the exercise of any of the powers vested in the cantonment authority, its officers and servants, by this Code, and shall make such compensation where the person sustaining the damage was not himself in default in the matter in respect of which the power was exercised.

(2) Where any dispute arises touching the amount of any compensation which the cantonment authority is required as aforesaid to pay for injury to any building or land, the matter shall be referred to, and decided by, a committee of arbitration constituted under Chapter XX.

Powers to be exercisable from time to time.

288. Every power conferred by this Code on the General Officer of the Command, the Officer Commanding the District, the cantonment authority, the Sanitary Officer or the Cantonment Magistrate may be exercised from time to time as occasion requires.

Method of framing notifications.

289. Where a notification under the Cantonments Act, 1889, or under this Code has been published at length in the official Gazette or in Station or Command Orders, it shall be sufficient, in any subsequent notification to the same effect in such Gazette or Orders as aforesaid, to refer to the number, date and subject of the previous notification.

XIII of 1889.

Validity of notices and other documents.

290. No notice, order, requisition, licence, permission in writing or other such document issued under this Code shall be invalid merely by reason of any defect of form.

291. No act done, or proceeding taken, under this Code shall be questioned merely by reason of the existence of any vacancy in the cantonment committee or in any sub-committee, or on account of any defect or irregularity not affecting the merits of the case.

Vacancies and irregularities not to invalidate proceedings.

292. (1) A copy of this Code and of any bye-laws made under section 169 or section 272 shall be kept at the office of the cantonment authority, and shall be open during office hours to the inspection, free of charge, of any inhabitant of the cantonment.

Rules and bye-laws to be available for inspection and purchase.

(2) Copies of this Code, including any such bye-laws as aforesaid, shall be kept at the office of the cantonment authority for sale to the public.

SCHEDULE 1.

(*See Chapter IV.*)

FORM I.

Register of Receipts into the_____Cantonment Fund.

Date.	No. of Counterfoil receipt.	From whom received.	MAJOR HEAD. Minor heads and sub-heads.		MAJOR HEAD. Minor heads and sub-heads.		Total of each receipt.	Daily total carried to Cash Book.
		Budget Estimate ...						
		Total for the month						
		Add total to end of last month.						
		Total from 1st April to date						

FORM 2.

RECEIPT.

[*To be retained in Cantonment Authority's Office.*]

No._____

Dated_____

Received from _____

_____

on account of _____

_____

Rs._____

[*To be sent to Accountant-General with the monthly extracts from the accounts.*]

No._____, dated _____

Received on account of_____

_____

(to be classified under the head_____

_____)

Rs. _____

*Signed*_____

[*To be given to the person from whom the money is received.*]

No._____, dated_____

Received from_____

_____

on account of _____

_____

Rs._____

*Signed*_____

FORM 3.

PASS BOOK.

The _____ *Treasury in account current with the* _____ *Cantonment Fund.*

CHEQUE BOOK NO._____

ADVISED_____

Date.	No. of Chalan.	Amount	Initials of the Officer in charge of the Treasury.	Date.	No. of Cheque.	Amount	Initials of the Officer in charge of the Treasury.

*Cheque Book No.*_____

*Cheque No.*_____

*Dated*_____

*To*_____

_____

FORM 4.

CANTONMENT FUND CHEQUE.

ONE-ANNA STAMP, *if the cheque is for an amount exceeding twenty rupees.*

*Cheque Book No.*_____

*Cheque No.*_____

*Dated*_____ *189*

*To the Officer in charge of the Treasury at*_____

*Pay to*_____

Rs._____ *and charge to the*_____

Cantonment Fund.

Under R 69

*Signed*_____

Secretary, Cantonment Committee,

or

President, Cantonment Committee,

or

Commanding Officer of the Cantonment.

This cheque is current for three months only.

FORM 5.

Register of payments from the _____ Cantonment Fund.

Date.	No. of Voucher.	No. of Cheque by which paid.	To whom paid.	MAJOR HEADS. Minor heads and sub-heads.								Total of each Voucher.	Daily Total carried to Cash Book.
			Budget Estimate										
			Total for the month ...										
			Add total to end of last month...										
			Total from 1st April to date...										

70.

FORM 6.

Imprest Register of the_____ ____Cantonment Fund.

AMOUNT OF IMPREST, Rs._____

Date.	No. of Sub-voucher.	To whom paid.	CLASSIFICATION.		Amount
			Major head.	Minor head and sub-head.	
		Total drawn from Treasury by Cheque No._____ on Voucher No._____			

FORM 7.

Cash Book of the_____Cantonment Fund.

RECEIPTS.					PAYMENTS.				
Date.	Amount as per Register of Receipts.				Date.	Amount as per Register of Payments.			
	Total of month ...					Total of month ...			
	Opening Balance ...					Closing Balance ...			
	GRAND TOTAL ...					GRAND TOTAL ...			

FORM 8.

Budget Estimate of Receipts into the_____Cantonment Fund for the year_____dated____189__.

Heads of Receipt.	Average (past three years).	Actuals (previous year).	Estimate (current year). Original as sanctioned by the Local Government.	Estimate (current year). Revised.	Estimate (ensuing year.)	Explanatory Remarks.
	Rs.	Rs.	Rs.	Rs.	Rs.	
I. LAND REVENUE—						
Income from Land						
II. EXCISE—						
Licence Fees and Duties						
III. ASSESSED TAXES—						
Taxes on Houses (*a*)						
Tax on Trades and Professions (*b*)						
Chaukidari Tax						
Octroi						
Miscellaneous (including Taxes on Horses and Carriages).						
TOTAL						
IV. POLICE—						
Fees, Fines and Forfeitures						
Unclaimed Property						
Miscellaneous (including Cattle-pound Receipts).						
TOTAL						
V. MINOR DEPARTMENTS—						
Agriculture—						
Public Gardens						
Sanitation—						
Conservancy Tax and Fees						
Sale of Manure, etc.						
Water-Supply—						
Water Rates...						
Other Receipts						
TOTAL						
VI. MISCELLANEOUS—						
Sale of Old Materials						
Contributions (*c*) Provincial and Local Grants. / Road Watering Subsciptions.						
Rents of Houses...						
Sales of Fruit, Grass, etc.						
Other Miscellaneous Receipts (Slaughter-houses, Markets, etc.) to be detailed in manuscript on the back of this form ...						
TOTAL						
VII. PUBLIC WORKS—						
Tolls and Ferries						
Miscellaneous						
TOTAL						
Total Receipts from local sources						
Grants-in-aid allotted by the General Officer of the Command, *viz.*—						
For Hospitals and Dispensaries						
For Conservancy						
For Sadr Bazar Establishments						
For Tree-tending and Forests						
For						
TOTAL						
Opening Balance						
GRAND TOTAL						

(*a*) To include, *e.g.*, compound tax.
(*b*) To include, *e.g.*, tax on weighmen.
(*c*) Purpose of any such contribution to be stated in "Explanatory Remarks" column.

CANTONMENT AUTHORITY'S OFFICE; *Dated* 189 . } *Secretary, Cantonment Committee.*

President, Cantonment Committee, or *Commanding Officer of the Cantonment.*

FORM 8.

Budget Estimate of Expenditure from the_____ Cantonment Fund for the year_____ dated_____ 189__.

Heads of Expenditure.	Average (past three years).	Actuals (previous year).	Estimate (current year). Original as sanctioned by the Local Government.	Estimate (current year). Revised.	Estimate (ensuing year).	Explanatory Remarks.
1. REFUNDS—	Rs.	Rs.	Rs.	Rs.	Rs.	
Refunds of Taxes						
Miscellaneous Refunds						
TOTAL						
2. CHARGES FOR COLLECTION OF LAND REVENUE						
Collecting Establishment						
Contingencies						
TOTAL						
3. GENERAL ADMINISTRATION—						
Establishment..						
Contingencies						
Contributions towards establishments in Government Offices (*a*).						
TOTAL						
4. LAW AND JUSTICE—COURTS OF LAW ...						
5. LAW AND JUSTICE—JAILS						
6. POLICE—						
Establishments						
Contingencies						
Miscellaneous (including Cattle-pounds and establishments therefor).						
TOTAL						
7. EDUCATION—						
Grants-in-aid to Schools						
8. MEDICAL—						
Hospitals and Dispensaries.						
Establishment						
Contingencies						
Vaccination.						
Establishment						
Contingencies						
TOTAL						
9. MINOR DEPARTMENTS—						
Public Gardens, Tree-tending and Forests.						
Establishment						
Contingencies						
Cemeteries.						
Establishment						
Contingencies						
Conservancy.						
Establishment						
Contingencies						
Public Fairs and Exhibitions.						
Establishment						
Contingencies						
Water-supply.						
Establishment						
Contingencies						
TOTAL						
10. SUPERANNUATION—						
Pensions (*b*)						
11. MISCELLANEOUS—						
Rents, Rates and Taxes						
Petty Establishments						
Contingencies						
TOTAL						
12. PUBLIC WORKS—						
Original Works.						
Buildings						
Roads						
Other works						
Maintenance and Repairs.						
Buildings						
Roads						
Other works...						
Petty construction and repairs						
TOTAL						
13. DEPOSITS AND ADVANCES						
TOTAL EXPENDITURE						
CLOSING BALANCE						
GRAND TOTAL						

(*a*) In the North-Western Provinces and Oudh, contributions towards cost of office establishment of District Superintendents of Police; and in the Lower Provinces, the Treasury rate.

(*b*) Sanctioned prior to the commencement of the Cantonment Code, 1899, which does not now allow the grant of pensions or gratuities.

CANTONMENT AUTHORITY'S OFFICE; *Dated the* 189 .

Secretary, Cantonment Committee.

President, Cantonment Committee, or *Commanding Officer of the Cantonment.*

FORM 8.—APPENDIX A.

Detailed List of Establishments provided for in the_____ Cantonment Fund Budget Estimate for the year_____.

Establishments engaged in Collection of Revenue.		Establishments engaged in General Administration.		Police Establishments.		Cattle-pound Establishments.	
Details.	Monthly cost.	Details.	Monthly cost.	Details.	Monthly cost.	Details.	Monthly cost.

Hospital and Dispensary Establishments.		Vaccination Establishments.		Establishments for Public Gardens, Tree-tending and Forests.		Cemetery Establishments.	
Details.	Monthly cost.	Details.	Monthly cost.	Details.	Monthly cost.	Details.	Monthly cost.

Establishments for Public Fairs and Exhibitions.		Water-supply Establishments.		Miscellaneous Petty Establishments.			
Details.	Monthly cost.	Details.	Monthly cost.	Details.	Monthly cost.		

P. T. O.

FORM 8.—APPENDIX A—*concluded.*

CONSERVANCY ESTABLISHMENTS.

General Station.		Sadr Bazar.		Latrines.	
Details.	Monthly cost.	Details.	Monthly cost.	Details.	Monthly cost.

*Signed*_____

Secretary, Cantonment Committee.

*Signed*_____

President, Cantonment Committee, or *Commanding Officer of the Cantonment.*

FORM 8.—APPENDIX B.

Detailed List of Expenditure provided for in the_____ Cantonment Fund Budget Estimate for the year_____other than that included in Appendices A, C and D.

1	2	3				4		
Major Head.	Minor heads and sub-heads.	Details.				Total assignment in Cantonment Fund Budget Estimate.		
			Rs.	A.	P.	Rs.	A.	P.
Refunds ...	Refunds of Taxes.							
	Miscellaneous Refunds.							
Charges for Collection of Revenue.	Contingencies.							
General Administration.	Contributions towards Establishments in Government Offices.							
Law and Justice —Courts of Law.	...							
Law and Justice —Jails.	...							

P. T. O.

FORM 8.—APPENDIX B—*continued.*

1	2	3				4		
Major Head.	Minor heads and sub-heads.	Details.				Total assignment in Cantonment Fund Budget Estimate.		
			Rs.	A.	P.	Rs.	A.	P.
Police ...	Contingencies.							
	Miscellaneous (including Cattle-pounds, but not Establishments therefor).							
Education ...	Grants-in-aid to schools.							
Medical ...	Hospitals and Dispensaries: Contingencies.	Fixed assignment to Cantonment Dispensary Fund.						

P. T. O.

FORM 8.--APPENDIX B—*continued.*

1	2	3				4		
Major head.	Minor heads and sub-heads	Details.				Total assignment in Cantonment Fund Budget Estimate.		
			Rs.	A.	P.	Rs.	A.	P.
Medical ...	Vaccination : Contingencies.							
Minor Departments.	Public Gardens, Tree-tending, and Forests : Contingencies.							
	Cemeteries : Contingencies.							

FORM 8.—APPENDIX B—*continued.*

1	2	3				4		
Major head.	Minor heads and sub-heads.	Details.				Total assignment in Cantonment Fund Budget Estimate.		
			Rs.	A.	P.	Rs.	A.	P.
Minor Departments.	Conservancy : Contingencies.							
	Public Fairs and Exhibitions : Contingencies.							
	Water-supply : Contingencies.							

P. T. O.

FORM 8.—APPENDIX B—*concluded.*

1	2	3				4		
Major head.	Minor heads and sub-heads.	Details.				Total assignment in Cantonment Fund Budget Estimate.		
			Rs.	A.	P.	Rs.	A.	P.
Superannuation	Pensions.*							
Miscellaneous	Rents, Rates and Taxes.							
	Contingencies.							
Deposits and Advances.	...							

*Signed*_____
Secretary, Cantonment Committee.

*Signed*_____
President, Cantonment Committee, or
Commanding Officer of the Cantonment.

Note.—All expenditure should be fully detailed in column 3, thus—

	Rs.	A.	P.
Purchase of three Crowley carts	450	0	0
„ of bullocks	100	0	0
Feed of ditto	168	0	0
Repairs and renewals to pans and receptacles	100	0	0
Purchase of gear	50	0	0
†Miscellaneous not included in above, but excluding any reserve ...	100	0	0
	968	0	0

* Sanctioned prior to the commencement of the Cantonment Code, 1899, which does not allow the grant of pensions or gratuities.

† This should include all petty expenditure which cannot be detailed, *but should not include anything of the nature of a reserve.*

MAJOR HEAD "Public Works." FORM 8.—APPENDIX C.

Details of Budget Estimate for Original Works (construction of Buildings, Roads, Latrines, etc.) in the _____ Cantonment for the year _____.

1	2	3	4	5	6	7
Sub-heads	Nature of each work.	Estimated cost of work.	*Estimate for current year.	Previously expended.	Estimate for (ensuing year).	REMARKS.
Buildings						
Roads						
Other works						

Note.—Column 3 will show the entire cost of the work; column 4, the sum sanctioned for expenditure during the current year; column 5, the amount previously expended since commencement of the work; and column 6, the amount proposed for expenditure during the ensuing year. Thus, if the work is to be completed during the ensuing year, the total of columns. 4, 5 and 6 will equal that in column 3; otherwise the difference will show the amount which will still be required to complete the work.

* *The totals in column 4 will agree with the allotments made in the body of the revised estimate for the current year.*

Signed _____

Secretary, Cantonment Committee.

Signed _____

President, Cantonment Committee, or *Commanding Officer of the Cantonment.*

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Details of Budget Estimate for Maintenance and Repairs in the _____ Cantonment for the year _____.

Sub-heads.	Nature of each work.	Estimate (ensuing year).	REMARKS.
Buildings			
Roads			
Other works			
Petty Construction and Repairs			

Signed _____

Secretary, Cantonment Committee.

Signed _____

President, Cantonment Committee, or *Commanding Officer of the Cantonment.*

L 2

SCHEDULE II.

(*See Section* 203.)

FORM OF NOTICE TO ATTEND AT HOSPITAL, ETC.

To_____

Take notice that, under section 203 of the Cantonment Code, 1899, you are hereby called upon to attend at the_____ on_____day, the_____, 18____, at_____o'clock____M., and not to quit the said_____ without the permission of the Medical Officer in charge, unless and until that Officer is satisfied that you are not in fact suffering, or are no longer suffering, from an infectious or contagious disorder, that is to say, from_____

_____

_____

Medical Officer in charge of the

_____

*Dated*_____*the*_____*18*____.

SCHEDULE III.

(*See section* 237.)

CASES IN WHICH POLICE MAY ARREST WITHOUT WARRANT.

1	2
Section.	Subject.
PART A.	
66 (*a*) (i)	Drunkenness, etc.
192	Making or selling of food, etc., or washing of clothes, by infected person.
272	In contravention of bye-law, cutting or destroying trees or shrubs or making excavations, etc., in hill cantonment.
PART B.	
66 (*a*) (ii)	Using threatening or abusive words, etc.
66 (*a*) (iii)	Indecent exposure of person, etc.
66 (*a*) (iv)	Begging.
66 (*a*) (v)	Exposing deformity, etc.
66 (*a*) (vii)	Gaming.
66 (*a*) (xii)	Destroying public notice, etc.
66 (*a*) (xiii)	Breaking direction-post, etc.
66 (*g*)	Keeping common gaming-house, etc.
66 (*h*)	Intruding on bathing-place, etc.
66 (*i*)	Playing music.
66 (*j*)	Singing, etc., so as to disturb public peace or order.
66 (*k*)	Firing gun, or doing other act, so as to frighten animals or cause annoyance or danger.
66 (*n*)	Baiting.

1	2
Section.	Subject.
PART B.—*cont.*	
87 (*2*)	Destroying, etc., name of street or number affixed to building.
135	Rash riding or driving.
136	Riding or driving at time or in manner prohibited.
137	Driving, etc., between nightfa and dawn without a suitable lamp.
139	Leaving vehicle or animal without proper control.
141	Obstructing street.
156	Polluting source of public drinking-water-supply.
157	Impairing quality, or diminishing quantity, of water in source of public drinking-water-supply or injuring or impairing usefulness of waterworks.
158	Trespass on water-works.
161	Throwing corpse into a source of public water-supply.
165	Bathing or washing at public well or spring so as to pollute the water.
170	Feeding animal on filth, etc.
204 (*2*)	Remaining in, or re-entering, cantonment after notice of expulsion for failure to attend hospital or dispensary.
205	Introducing liquor or drug into hospital or dispensary.
208	Mendicancy.
209	Loitering or importuning for sexual immorality.
210 (*3*)	Remaining in, or returning to, a cantonment after notice of expulsion.
211	
213	Cruelty to animals
219	Letting off fire-works, etc., without permission.

SCHEDULE IV.

(See Chapter XIX.)

APPEALS FROM EXECUTIVE ORDERS.

1	2	3	4
Section.	Executive order.	Appellate authority.	Time allowed for appeal.
21	Cantonment Magistrate's order dismissing servant of cantonment authority whose salary is less than twenty-five rupees a month.	Cantonment authority.	Thirty days from date of order.
	Cantonment Magistrate's order, passed with previous sanction of cantonment authority, dismissing servant of cantonment authority whose salary is not less than one hundred rupees a month.	General Officer of the Command.	Thirty days from date of order.
76 (*g*)	Cantonment authority's notice to provide sufficient drainage.	Officer Commanding the district.	Fifteen days from service of notice.
80	Cantonment authority's notice to fill up a tank or marshy ground, or to drain off or remove waste or stagnant water.	Officer Commanding the district.	Thirty days from service of notice.
83	Cantonment authority's notice requiring a building to be repaired or altered so as to remove sanitary defects.	General Officer of the Command.	Thirty days from service of notice.
89 (*1*)	Cantonment authority's refusal to sanction the erection or re-erection of a building.	Officer Commanding the district.	Thirty days from date of refusal.
89 (*3*)	Cantonment authority's notice to alter or demolish a building.	Officer Commanding the district.	Thirty days from service of notice.
92	Cantonment authority's notice to pull down or otherwise deal with a building newly erected or rebuilt without permission over a sewer, drain, culvert, water-course or water-pipe.	Officer Commanding the district.	Thirty days from service of notice.
93	Cantonment authority's notice to repair, protect or enclose a building, well, tank, reservoir, pool, depression or excavation.	Officer Commanding the district.	Thirty days from service of notice.
94	Cantonment authority's notice to remove a building, wall or structure or anything affixed thereto, or a bank or tree, or to repair a building, wall, structure, or bank.	Officer Commanding the district.	Thirty days from service of notice.
107 (*1*)	Cantonment authority's notice to close a sarai.	District Magistrate	Thirty days from service of notice.
116 (*3*)	Cantonment authority's notice to close a market.	General Officer of the Command.	Thirty days from service of notice.

1 Section.	2 Executive order.	3 Appellate authority.	4 Time allowed for appeal.
123	Cantonment authority's notice prohibiting or restricting the use of a slaughter-house.	District Magistrate	Twenty-one days from service of notice.
204	Order of Commanding Officer of cantonment, on report of Medical Officer, directing a person to remove from the cantonment and prohibiting him from re entering it without permission.	Officer Commanding the district.	Thirty days from service of notice.
210 (3)	Cantonment Magistrate's notice, directing a person to remove from the cantonment and prohibiting him from re-entering it without permission.	District Magistrate	Thirty days from service of notice.
211	Cantonment Magistrate's notice, issued on order of the Commanding Officer of cantonment, directing a person to remove from the cantonment and prohibiting him from re-entering it without permission.	Officer Commanding the district.	Thirty days from service of notice.
246 (2)	Order of Commanding Officer of cantonment refusing to convene a Committee of Arbitration.	General Officer of the Command.	Thirty days from date of order.
259 and Schedule V. (Conditions of Lease).	Cantonment authority's notice, in pursuance of conditions of lease, requiring a lessee to let a house, not already occupied by a military officer, to a military officer.	General Officer of the Command.	Twenty-one days from service of notice.
	Cantonment authority's notice, in pursuance of conditions of lease, requiring a lessee to let a house to a civil officer.	General Officer of the Command.	Twenty-one days from service of notice.
	Cantonment authority's notice, in pursuance of conditions of lease, requiring a tenant to vacate a house.	General Officer of the Command.	Twenty-one days fron service of notice.

SCHEDULE V.

(*See section* 259.)

FORM A.

FORM OF LEASE TO BE EXECUTED IN CASES OF LAND APPLIED FOR BY A RAILWAY COMPANY OR FOR THE PURPOSE OF ERECTING A HOSPITAL, SCHOOL OR OTHER PUBLIC BUILDING, OR OF LAND SITUATE IN A BAZAR.

This Indenture, made the day of , between the SECRETARY OF STATE FOR INDIA in Council (hereinafter called the Secretary of State) of the one part and , son of , of , (hereinafter called the Lessee) of the other part.

Whereas the Lessee has applied for permission to occupy, for the purposes of a building-site, the land belong to the Government in the Cantonment which is delineated in the site-plan hereto appended, and has submitted with his application the particulars and documents required by sections 256 and 257 of the Cantonment Code, 1899 ;

And whereas the said application has received the sanction of the * ;

Now this Indenture witnesseth as follows :

1. The Secretary of State doth hereby grant unto the Lessee, his heirs, executors, administrators, representatives and assigns, liberty and license to enter into and upon the piece or parcel of land delineated in the site-plan hereto appended, and henceforth to occupy and enjoy the same as a site for the erection of buildings, and henceforth to hold and enjoy the same and any buildings erected by him thereon †, subject to the conditions set forth in the annexure hereto.

2. The Lessee doth hereby, for himself, his heirs, executors, administrators, representatives and assigns, covenant with the Secretary of State, his successors and assigns, that the Lessee, his heirs, executors, administrators, representatives and assigns, shall and will [‡duly pay the said rents in the manner provided in the annexure hereto and] observe all and every the conditions hereinbefore referred to and on his and their part to be observed.

In witness whereof the said parties hereto have hereunto set their hands and seals the day and year first above written.

Signed, sealed and delivered by , Principal Staff Officer of the Command, on behalf of ,§ acting in the premises for and on behalf of the Secretary of State for India in Council, in the presence of

Seal

Signed, sealed and delivered by the above-named , in the presence of

Seal

* Insert, as the case may be "the General Officer of the Command," or, if the land is situate in a bazar, "the cantonment authority of ."

† Insert, as the case may be, "free of rent, but," or "subject to the payment of the yearly rent of rupees , and".

‡ The words in brackets to be omitted if the land is rent-free.

§ Insert, as the case may be, "the General Officer of the Command," or, if the land is situate in a bazar, "the cantonment authority of ."

ANNEXURE TO FORM A.

CONDITIONS.

CONDITION I.—The buildings to be erected on the land in accordance with the site-plan appended to the lease shall be commenced within six months from the execution of the lease, and shall be completed within the period specified in the note indorsed on such plan, or within such further period (if any) as the authority which sanctioned the application under Chapter XXI. of the Cantonment Code, 1899, may, by order in writing, allow.

Commencement and completion of buildings.

CONDITION II.—(1) Buildings may be erected on the land only in accordance with the site-plan appended to the lease or, where a proposed building, alteration or addition is not in accordance with such plan, with the written permission of the authority which sanctioned the application under Chapter XXI of the Cantonment Code, 1899.

Erection of buildings.

(2) Any such permission may be made subject to any conditions which may be agreed upon between such authority and the Lessee.

CONDITION III.—The land shall not be used for any purposes other than those specified in the Lessee's application under section 256, clause (*d*), of the Cantonment Code, 1899 : nor shall the buildings erected on the land be permitted to fall into such a state of ruin as absolutely to prevent their being used for the purposes so specified :

Use of land and maintenance of buildings.

Provided always, that it shall so be obligatory on the Lessee to commence rebuilding the

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NOTE.—Copies of this form, with the Annexure, will be obtainable gratis on application to the Cantonment Magistrate.

same, if destroyed or injured by earthquake, fire, cyclone or other act of God, within six months of such destruction or injury, and to reinstate the same fit for use for the purposes so specified as aforesaid within such period, not exceeding two years after the same shall have been so destroyed or injured, as aforesaid, as to * shall seem fit, provided nevertheless that in no such case shall the Lessee be required to reinstate the same fit for use as aforesaid within a shorter period than 12 calendar months from the date of such destruction or injury.

* Insert, as the case may be "the General Officer of the Command," or, if the land is situate in a bazar, "the cantonment authority of ".

CONDITION IIIA.†—The Lessee shall pay the said yearly rent of rupees by equal monthly instalments of rupees , and the said instalments shall be paid on the fifteenth day of every month during the continuance of this demise for the month immediately preceding.

† This condition to be omitted if the land is rent-free.

CONDITION IV.—(1) Whenever the Lessee intends to transfer, by sale, gift, mortgage or exchange, his interest in the land, or in the buildings erected on the land, or in any part of the land or buildings, he or the intended transferee shall give the Cantonment Magistrate one month's notice in writing before the transfer is completed.

Power to veto transfer of Lessee's interest in certain cases.

(2) The General Officer of the Command shall have power, within the said period of one month and with the concurrence of the Local Government, to impose, by order in writing, his veto on any such transfer ; and, if in any case the cantonment authority considers it desirable that the said power of veto should be exercised, it shall report the case to such General Officer without delay.

(3) If notice of any such transfer is not given as aforesaid, or if any such transfer is made after the same has been vetoed, the transfer shall be void.

CONDITION V.—Every person on whom the Lessee's interest in the land, or in the buildings erected on the land, may dovolve by transfer, by succession or by operation of law, shall send to the cantonment authority, within one month from the date of such devolution, a report in writing of the fact, together with such particulars as may be required by the cantonment authority for entry in the register maintained under section 266 or 267, as the case may be, of the Cantonment Code, 1899.

Report of devolution of Lessee's interest.

CONDITION VI.—(I) If the Lessee does not commence or complete, as required by Condition I, the buildings to be erected on the land, the cantonment authority may, by notice in writing, require him to remove all or any buildings or materials which he may have erected or collected thereon ; and, if he fails to comply with such notice, the cantonment authority may, after giving him six hours' further notice in writing, cause such removal to be effected and recover the cost from him, and may also cancel the lease.

Procedure on breach of Condition I. or Condition II.

(2) If the Lessee erects any building or makes any alteration or addition otherwise than as allowed by or under Condition II, the cantonment authority may, by notice in writing, require him to remove the building, or to alter the same to its satisfaction ; and, if he fails to comply with such notice, the cantonment authority may, after giving him six hours' further notice in writing, cause such removal or alteration to be effected and recover the cost from him.

CONDITION VII.—(1) So long as the Lessee, his heirs, executors, administrators, representatives or assigns, shall duly, [*pay the said rent of rupees and] observe the conditions hereinbefore specified, and on his part to be observed, he or they may, subject to Condition IX, hold the land for ever without interruption by the Secretary of State, his successors in office and assigns.

Forfeiture for breach of any other Condition.

* The words in brackets to be omitted, if the land is rent-free.

(2) If the Lessee, his heirs, executors, administrators, representatives or assigns, shall [†fail to pay the said rent of rupees for twenty-one days after the same shall have become due or shall], in the event of the said buildings being destroyed or injured by earthquake, fire, cyclone or other act of God, fail to commence rebuilding the same as provided in Condition III hereof within six months of such destructien or injury and to reinstate the same fit for use as provided in the said Condition III hereof and within such period as therein provided, or shall break any of the remaining conditions hereinbefore specified, other than Condition I or Condition II, and on his or their part to be observed, the Local Government may, after giving one month's notice in writing, resume the land or any portion thereof, and may, on such resumption, declare all or any part of the right and interest of the Lessee, his heirs, executors, administrators, representatives or assigns, in the buildings erected on the land to be forfeited.

† The words in brackets to be omitted, if the land is rent-free.

CONDITION VIII.—The Lessee, his heirs, executors, administrators, representatives or assigns, shall not be entitled to compensation for any loss incurred by reason of anything done in pursuance of Condition VI or Condition VII, clause (2).

Claims to compensation barred.

CONDITION IX.—The Local Government may resume the Land or any portion thereof at any time, after giving one month's notice in writing, and on payment of compensation for such buildings standing on the land or portion thereof as shall have been erected under proper authority. If there shall be any dispute as to the amount of such compensation, the same shall be referred to a committee of arbitration, which shall

Right of the Government to resume the land on payment of compensation for buildings.

be constituted as provided in Chapter XX of the Cantonment Code, 1899, and the Lessee, his theirs, executors, administrators, representatives and assigns, shall be bound by the decision of the committee of arbitration.

FORM B.

FORM OF LEASE TO BE EXECUTED IN ALL CASES OTHER THAN THOSE FOR WHICH FORM A ABOVE IS PRESCRIBED.

This Indenture, made the day of , between the SECRETARY OF STATE FOR INDIA IN COUNCIL (hereinafter called the Secretary of State) of the one part, and , son of , of (hereinafter called the Lessee) of the other part.

Whereas the Lessee has applied for permission to occupy, for the purposes of a building-site, the land belonging to the Government in the Cantonment which is delineated in the site-plan hereto appended, and has submitted with his application the particulars and documents required by sections 256 and 257 of the Cantonment Code, 1899 :

And whereas the said application has received the sanction of the General Officer of the Command ;

Now this Indenture witnesseth as follows :

1. The Secretary of State doth hereby grant unto the Lessee, his heirs, executors, administrators, representatives and assigns, liberty and license to enter into and upon the piece or parcel of land delineated in the site-plan hereto appended, and to occupy the same as a site for the erection of buildings and henceforth to hold and enjoy the same and any buildings erected by him thereon,* subject to the conditions set forth in the annexure hereto.

2. The Lessee doth hereby, for himself, his heirs, executors, administrators, representatives and assigns, covenant with the Secretary of State, his successors and assigns, that the Lessee, his heirs, executors, administrators, representatives and assigns, shall and will duly [† pay the said rent in the manner provided in the annexure hereto and] observe all and every the conditions hereinbefore referred to and on his and their part to be observed.

In Witness whereof the said parties hereto have hereunto set their hands and seals the day and year first above written.

Signed, sealed and delivered by , Principal Staff Officer of the Command, on behalf of the General Officer of the said Command, acting in the premises for and on behalf of the Secretary of State for India in Council, in the presence of (Seal)

Signed, sealed and delivered by the above-named in the presence of (Seal)

*Insert, as the case may be, "free of rent but," or "subject to the payment of the yearly rent of rupees and."

†The words in brackets to be omitted if the land is rent-free.

ANNEXURE TO FORM B.

CONDITIONS.

In the Conditions—

(*a*) "house" means the house erected on the land occupied by the Lessee, and includes the land and buildings appurtenant to the house; and, if any question arises whether any land or building is appurtenant to the house, it shall be decided by the Cantonment Magistrate, whose decision thereon shall, subject to revision by the District Magistrate, be final :

(*b*) the expression "repairs" to a house shall be deemed to include such repairs as are usually made in the neighbourhood to buildings of the same class as that to which the house belongs, but does not include additions, improvements or alterations except in so far as they are necessary to carry out such repairs as aforesaid or have been made with the Lessee's consent :

(*c*) "military officer" means a commissioned or warrant officer of the army on military duty in the cantonment, and includes a chaplain, a Cantonment Magistrate and any person in Army departmental employment whom the General Officer of the Command may, for the purposes of these Conditions, place on the same footing as a military officer : and

(*d*) "civil officer" means a gazetted civil officer of the Government, and includes any other person in the service of the Government, not being a military officer, whom the Local Government may for the purposes of these Conditions place on the same footing as a civil officer.

CONDITION I.—The buildings to be erected on the land in accordance with the site-plan appended to the lease shall be commenced within six months from the execution of the lease, and shall be completed within the period specified in the note endorsed on such plan, or within such further period (if any) as the authority which sanctioned the application under Chapter XXI of the Cantonment Code, 1899, may, by order in writing, allow.

Commencement and completion of buildings.

NOTE.—Copies of this form, with the Annexure, will be obtainable gratis on application to the Cantonment Magistrate.

CONDITION II.—(1) Buildings may be erected on the land only in accordance with the site-plan appended to the lease or, where a proposed building, alteration or addition is not in accordance with such plan, with the written permission of the authority which sanctioned the application under XXI of the Cantonment Code, 1899.

Erection of buildings.

(2) Any such permission may be given subject to any conditions which may be agreed upon between such Authority and the Lessee.

CONDITION III.—The land shall not be used for any purpose other than those specified in the Lessee's application under section 256, clause (*d*) of the Cantonment Code, 1899; nor shall the buildings erected on the land be permitted to fall into a state of ruin as absolutely to prevent their being used for the purpose so specified;

Use of land and maintenance of buildings.

Provided, always that it shall be obligatory on the Lessee to commence rebuilding the same, if destroyed or injured by earthquake, fire, cyclone, or other act of God, within six months of such destruction or injury, and to reinstate the same fit for use for the purposes so specified as aforesaid within such period, not exceeding two years, after the same shall have been so destroyed or injured as aforesaid, as to the General Officer of the Command shall seem fit, provided, nevertheless, that in no case shall the Lessee be required to reinstate the same fit for use as aforesaid within a shorter period than twelve months from date of such destruction or injury.

CONDITION III A.*—The Lessee shall pay the said yearly rent of rupees by equal monthly instalments of rupees , and the said instalments shall be paid on the fifteenth day of every month during the continuance of this demise for the month immediately preceding.

* This condition to be omitted, if the land is rent-free.

CONDITION IV.—(1) Whenever the Lessee intends to transfer, by sale, gift, mortgage or exchange, his interest in the land, or in the buildings erected on the land, or in any part of the land or buildings, he or the intended transferee shall give the Cantonment Magistrate one month's notice in writing before the transfer is completed.

Power to veto transfer of Lessee's interest in certain cases.

(2) The General Officer of the Command shall have power, within the said period of one month, and with the concurrence of the Local Government, to impose, by order in writing, his veto on any such transfer; and, if in any case, the cantonment authority considers it desirable that the said power of veto should be exercised, it shall report the case to such General Officer without delay.

(3.) If notice of any such transfer is not given as aforesaid, or if any such transfer is made after the same has been vetoed, the transfer shall be void.

CONDITION V.—Every person on whom the Lessee's interest in the land, or in the buildings erected on the land, may devolve, by transfer, by succession or by operation of law, shall send to the cantonment authority, within one month from the date of such devolution, a report in writing of the fact, together with such particulars as may be required by the cantonment authority for entry in the register maintained under section 266 or section 267, as the case may be, of the Cantonment Code, 1899.

Report of devolution of Lessee's interest.

CONDITION VI.—The Government reserves a right, subject to the Conditions hereinafter contained, to appropriate the house at any time for occupation by any military officer or civil officer.

Right of the Government to appropriate the house for occupation by any military or civil officer.

CONDITION VII.—If the Lessee lets the house to any person other than a military officer or (if the house has been set apart in accordance with Condition X for occupation by civil officers) a civil officer, possession of the house shall not be given until—

Agreement to vacate to be executed when house is let to any person other than a military or civil officer.

(*a*) such person has executed a stamped agreement undertaking to vacate the house whenever required so to do in pursuance of a notice issued under Condition VIII or Condition X without claiming any compensation, and has registered such agreement under the law for the time being in force relating to the registration of documents, and

(*b*) the Lessee has forwarded an attested copy of such agreement to the cantonment authority.

CONDITION VIII.—Whenever the Cantonment authority considers that the right reserved by Condition VI should be exercised in behalf of any military officer, it may, if the house is not already occupied by a military officer, and if it has not been set apart in accordance with Condition X for occupation by civil officers, by notice in writing—

Appropriation of house for a military officer, where it is not already occupied by a military officer.

(*a*) require the Lessee to let the house to the military officer named in the notice, and

(*b*) require the existing tenant (if any) to vacate the same.

CONDITION IX.—If the house is occupied by a departmental military officer and the cantonment authority considers that the right reserved by Condition VI should be exercised in behalf of a regimental officer, or *vice versâ*, it may, by notice in writing, require the officer in occupation to vacate the house;

Appropriation of house for a military officer, where it is occupied by another military officer.

and may, if necessary, by further notice in writing, require the Lessee to accept the change of tenancy.

CONDITION X.—(1) The cantonment authority may, at any time, with the previous sanction of the General Officer of the Command given with the concurrence of the Local Government, set apart the house for occupation by civil officers.

Appropriation of house for civil officers.

(2) If the house has been so set apart, the arrangement shall not be revoked without the concurrence of the Local Government.

(3) If, while the house is so set apart, the cantonment authority at any time considers that the right reserved by Condition VI should be exercised in behalf of any civil officer, it may, if the house is not already occupied by a civil officer, by notice in writing,—

(*a*) require the Lessee to let the house to the civil officer named in the notice, and

(*b*) require the existing tenant (if any) to vacate the same.

CONDITION XI.—(1) Whenever a military officer or a civil officer considers that a notice should be issued in his behalf under Condition VIII, Condition IX or Condition X, he may request (in the case of a regimental officer) the Commanding officer of his regiment, or (in the case of a departmental military officer) the local head of his Department, or (in the case of a civil officer) the District Magistrate, to make an application to that effect to the cantonment authority.

Procedure to be observed before appropriating house.

(2) On receipt of any such application the cantonment authority shall inquire into the case, and it shall not issue the notice unless it is satisfied—

(*a*) that the officer ought to reside in the cantonment, and

(*b*) that the circumstances are such as to require its intervention, and

(*c*) that the rent offered by the officer for the house is reasonable, and,

(*d*) if the house is vacant, that it is suitable for the residence of the officer, and

(*e*) if the house is occupied, that it is suitable for the residence of the officer, and that there is no vacant house in the cantonment which is suitable for his residence.

Explanation.—In considering whether a house is suitable for the residence of an officer, regard shall be had to (i) the locality in which his duties chiefly lie and (ii) his rank.

CONDITION XII.—(1) The house shall not be occupied for the purposes of a bank, hotel, shop or school, or by a railway company, without the previous sanction in writing of the General Officer of the Command, given with the concurrence of the Local Government.

Sanction to be obtained before house is occupied as a bank, hotel, shop or school, or by a railway company.

(2) Before the application is made for such sanction, the Commanding officer of the cantonment shall certify whether or not in his opinion the number of houses in the cantonment, as compared with the strength of the existing or probable garrison, renders it likely that such occupation as aforesaid would—

(*a*) cause any difficulty in obtaining accommodation in the cantonment, or in the part of the cantonment in which the house is situate, for military officers or civil officers, or

(*b*) necessitate the acquisition of land at some future time for the extension of the cantonment.

House not to be appropriated for military or civil officer if it is occupied, with sanction, as a bank, hotel, shop or school, or by a railway company, or is otherwise appropriated by the Government.

CONDITION XIII.—No notice shall be issued under Condition VIII or Condition X if the house—

(*a*) is occupied, with the sanction required by Condition XII, as a bank, hotel, shop or school, and has been so occupied continuously during the three years immediately preceding the time when the occasion for issuing the notice arises, or

(*b*) is occupied, with the sanction aforesaid, by a railway company, or

(*c*) is appropriated by the Local Government, with the concurrence of the General Officer of the Command, or by the Governor General in Council, for use as a public office or for any other purpose.

CONDITION XIV.—Every notice to the Lessee issued under Condition VIII, Condition IX or Condition X, shall state the amount of monthly rent which the proposed tenant offers to pay for the house.

Rent offered to be stated in notice to Lessee.

CONDITION XV.—(1) If the house is unoccupied, any notice issued under Condition VIII or Condition X may require the Lessee to give possession of the same to the proposed tenant within four days from the service of the notice.

Time to be allowed for giving possession of house.

(2) If the house is occupied, no such notice as aforesaid shall require its vacation in less than thirty days from the service of the notice.

CONDITION XVI.—(1) Subject to the terms of any agreement in writing between the Lessee and a military officer or a civil officer, and to the terms of this condition, every lease of the house to such an officer shall be deemed to be a lease from month to month, terminable—

Terms of tenancy applicable to military and civil officers.

(*a*) without notice, in the case of the departure of the officer from the cantonment on duty or under medical certificate, or in the case of a committee of arbitration deciding that the house has become unfit for occupation, or

(*b*) by one month's notice in writing to the Lessee in any other case.

(2) A notice under clause (1) of this condition must be signed by or on behalf of the officer concerned ; and the Cantonment Magistrate shall, if the officer so desires, cause it to be served on the Lessee free of charge.

(3) When a military officer or a civil officer has, in pursuance of clause (1) of this condition, given up his occupation of the house without notice, and has occupied the house during a portion only of the calendar month in which his occupation ceased, he shall be liable to pay as rent for that portion a sum bearing the same proportion to the monthly rent as the said portion bears to the whole month.

Provided that the sum shall not, in any case, be less than one-fourth of the monthly rent.

CONDITION XVII.—If any tenant of the house, being a military officer or a civil officer, sub-lets the same without the consent of the Lessee, the sub-lease shall be voidable at the option of the Lessee.

Sub-lease voidable at option of Lessee.

CONDITION XVIII.—(1) If the Lessee considers that any rent offered by a proposed tenant and stated in a notice in accordance with Condition XIV is insufficient, he may, within a period of fifteen days from the service of such notice, require that the matter be referred by the Commanding Officer of the cantonment to a committee of arbitration.

Right of Lessee to require reference to arbitration on question of rent.

(2) If the Lessee does not make such a requisition within the said period, he shall be deemed to have accepted the rent so offered.

(3) After such acceptance or the decision of a committee of arbitration, the amount of such rent shall not be called in question by either party except in the circumstances mentioned in clause (*a*) of Condition XXI.

CONDITION XIX.—(1) If the Lessee fails to execute any repairs to the house which any tenant, being a military or civil officer, may consider necessary, the cantonment authority may, at the request of the tenant, and if it is satisfied that such repairs or any of them are necessary, by notice in writing, require the Lessee to execute such repairs or such of them as it may consider necessary, within a period, not less than fifteen days, to be specified in the notice.

Right of Lessee to require reference to arbitration on question of repairs.

(2) If the Lessee objects to comply with any notice issued under clause (1) of this condition, he may, within fifteen days from the service of the notice, require that the matter be referred by the Commanding Officer of the cantonment to a committee of arbitration.

CONDITION XX.—If any tenant of the house being a military or civil officer, considers that his lease should be terminable without notice in consequence of the house having become unfit for occupation, he may apply to the Commanding officer of the cantonment to refer the matter to a committee of arbitration.

Power of tenant to apply for reference to arbitration on question whether house has become unfit for occupation.

CONDITION XXI.—If the Lessee and any tenant of the house, being a military or civil officer, disagree—

Power of either Lessee or tenant to apply for reference to arbitration on other questions.

(*a*) as to any change in the rent of the house which it is proposed in consequence of dilapidations or additions to buildings or for any other similar reason, or

(*b*) on any matter relating to rent or repairs, other than a matter referred to in clause (*a*) of this condition or in Condition XVIII, Condition XIX or Condition XX,

either the Lessee or the tenant may apply to the Commanding Officer of the cantonment to refer the matter to a committee of arbitration.

CONDITION XXII.—Whenever any matter is referred to a committee of arbitration in pursuance of Condition XVIII, Condition XIX, Condition XX or Condition XXI, the Committee shall be constituted as provided in Chapter XX of the Cantonment Code, 1899, and the Lessee and his tenant shall be bound by the decision of the committee.

Constitution of committee of arbitration; its decision to be binding on Lessee and his tenant.

CONDITION XXIII.—If the Lessee fails to comply with any notice issued under clause (1) of Condition XIX, and has not, within fifteen days from the service of such notice, required that the matter be referred to a committee of arbitration, or

Right of tenant to execute repairs and deduct cost from rent.

if any committee of arbitration constituted under Chapter XX of the Cantonment Code, 1899, decides that repairs are necessary and the extent to which they are necessary, and the Lessee fails to execute such repairs within a period to be specified in a notice issued by the cantonment authority in that behalf,

the tenant of the house may himself cause the repairs specified in the notice to be executed at rates not exceeding those paid in the cantonment by the Military Works Department or the Public Works Department, and may deduct the cost thereof from the rent, or otherwise recover it from the Lessee.

CONDITION XXIV.—(1) If the Lessee does not commence or complete, as required by Condition I, the buildings to be erected on the land, the cantonment authority may, by notice in writing, require him to remove all or any buildings or materials which he may have erected or collected thereon; and, if he fails to comply with such notice, the cantonment authority may, after giving him six hours' further notice in writing, cause such removal to be effected and recover the cost from him, and may also cancel the lease.

Procedure on breach of Condition I or Condition II.

(2) If the Lessee erects any building or makes any alteration or addition otherwise than as allowed by or under Condition II, the cantonment authority may, by notice in writing, require him to remove the building or to alter the same to its satisfaction; and, if he fails to comply with such notice, the cantonment authority may, after giving him six hours' further notice in writing, cause such removal or alteration to be effected and recover the cost from him.

CONDITION XXV.—(1) So long as the Lessee, his heirs, executors, administrators, representatives, or assigns, shall [duly pay the said rent of rupees and]* observe the conditions hereinbefore specified and on his or their part to be observed, he or they may, subject to Condition XXVII, hold the land for ever without interruption by the Secretary of State, his successors and assigns.

Forfeiture for breach of any other condition.

(2) If the Lessee, his heirs, executors, administrators, representatives or assigns, shall [fail to pay the said rent of rupees , for twenty-one days after the same shall have become due or shall],† in the event of the said buildings being destroyed or injured, by earthquake, fire, cyclone or other act of God, fail to commence rebuilding the same as provided in Condition III hereof within six months of such destruction or injury and to reinstate the same fit for use as provided in the said Condition III hereof, and within such period as therein provided, or shall break any of the remaining conditions hereinbefore specified, other than Condition I or Condition II, and on his or their part to be observed, the Local Government may, after giving one month's notice in writing, resume the land or any portion thereof, and may, on such resumption, declare all or any part of the right and interest of the Lessee, his heirs, executors, administrators, representatives or assigns, in the buildings erected on the land to be forfeited.

*The words in brackets to be omitted if the land is rent-free.

†The words in brackets to be omitted, if the land is rent-free.

CONDITION XXVI.—The Lessee, his heirs, executors, administrators, representatives and assigns, shall not be entitled to compensation for any loss incurred by reason of anything done in pursuance of Condition XXIV or Condition XXV, clause (2).

Claims to compensation barred.

CONDITION XXVII.—The Local Government may resume the land or any portion thereof at any time after giving one month's notice in writing, and on payment of compensation for such buildings standing on the land or portion thereof as shall have been erected under proper authority. If there shall be any dispute as to the amount of such compensation, the same shall be referred to a committee of arbitration, which shall be constituted as provided in Chapter XX of the Cantonment Code, 1899, and the Lessee, his heirs, executors, administrators, representatives and assigns, shall be bound by the decision of the committee of arbitration.

Right of the Government to resume the land on payment of compensation for building.

R E T U R N.

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"PORTIONS of the Annual Report of the Indian Section of the Imperial Institute for the Year ending the 31st day of March 1899, and of the preceding two years, embodying the more important details of the working of the Section, and the results obtained in the scientific investigations of selected natural products from India, carried on at the Imperial Institute."

India Office,
8 August 1899.

A. GODLEY,
Under Secretary of State.

(Sir Mancherjee Bhownaggree.)

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8 *August* 1899.

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EXTRACTS

FROM THE

ANNUAL REPORTS

FOR THE YEARS

1896–97, 1897–98, and 1898–99.

[*In continuation of No.* 151 *of* 1896.]

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Mr. J. R. Royle, C.I.E. (*Secretary and Curator*).

NOTE.—The names of Governors and Members of the Special Sub-Committee are given as they stood on March 31st, 1899.

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REPORT FOR 1896—97.

1896-97.

LETTER from the CHAIRMAN of the SPECIAL SUB-COMMITTEE of the INDIAN SECTION of the IMPERIAL INSTITUTE to the UNDER SECRETARY OF STATE FOR INDIA.

India Office,
18th June 1897.

Sir,

As Chairman of the Special Sub-Committee of the Indian Section of the Imperial Institute, I have, in accordance with the India Office letter of the 13th November, 1896, the honour to submit, for the information of the Secretary of State for India in Council, and ultimate communication to the Government of India, the accompanying Report on the Administration of the Section during 1896–7, the first year of the existence of the Special Committee.

From the Report of the Curator it will be seen that the heavy arrears which had accumulated during the years 1894 and 1895, mainly through want of funds, have been overtaken by Mr. Royle and his staff, and the Indian Section is now, I am glad to say, in fairly good working order. The commercial samples exhibited in the Section number 8,769.

During the year, under the orders of the Committee, collections of Indian products have been prepared and lent to the Cardiff Exhibition, and to the Salvation Army Exhibition; and an excellent and most creditable collection was also made for the Indian Section of the Imperial Victorian Exhibition at the Crystal Palace. In addition to these, several smaller collections of Indian economic products have been provided to illustrate lectures at various institutions on Indian subjects. In this way, much good is, I believe, being done at small cost to Indian revenues.

During the year under review, 357 samples from the Indian Section "sample stores" were issued to experts for chemical analysis and commercial examination. It is to be regretted that so very few inquiries from commercial men regarding Indian products are either made or addressed to the Section, but the Committee hope to be able, as their work becomes better known, to create a greater interest among business men in the Indian Section.

The conduct of correspondence between the Imperial Institute and the Government of India by means of direct Flying Seal letters has been found to greatly facilitate the work of the Section; and it seems worthy of consideration whether on similar lines a larger interchange of information between the various departments of the Imperial Institute might not tend to increase their general efficiency.

The report by Professor Dunstan on the work done for India in the Scientific Department of the Imperial Institute during 1896–7 is most interesting, and is a gratifying testimony to the special value to India of this branch of the Institute. The chemical investigations carried out during the year under review of such important products as jute, and other indigenous fibres, tans, gums, tobacco, food grains, and oils, and of opium and iron ores, cannot fail to be of the utmost benefit to India; and Dr. Watt appears to be fully convinced of their value. He is making the greatest possible use of the Scientific Department for undertaking examinations of almost every variety of Indian economic produce; and the results of these careful scientific researches are periodically published by Dr. Watt in the Agricultural Ledgers issued by the Revenue and Agricultural Department, and thus made widely known all over India with the least possible delay. As Professor Dunstan very truly observes, the time and attention of the larger part of the staff of the Scientific Department of the Imperial Institute has, during the past year, been entirely devoted to Indian investigations.

I learn from Sir George Birdwood that numerous inquiries regarding Indian economic products continue to be addressed to the India Office, or to him personally, by merchants, and others, who seem to remain under the impression that the old department of the Reporter on Economic Products of India to the Secretary of State is still in existence. But Sir George Birdwood believes that when it becomes more generally recognised, as it will be through the publication of the present Report, that the Indian Section of the Imperial Institute is

now efficiently discharging for this Office some of the more responsible duties formerly undertaken by the Reporter on Products here, such inquiries will, for the most part, be addressed direct to the Imperial Institute. This end will also be promoted in another way by the publication of the Report. Through a long and intimate acquaintance with business men, Sir George Birdwood has found that they uniformly prefer dealing with a Government Department rather than with institutions outside official control; and when it becomes known that the Indian Section of the Imperial Institute is directly administered by the India Office, popular confidence in the former will be proportionately strengthened, and commercial inquirers will refer to it freely, and frankly consult its officers. It is this conviction which has so largely influenced Sir George Birdwood in supporting the action taken by the Secretary of State in appointing a special official Committee for the administration of the Indian Section of the Imperial Institute, and establishing the present *modus vivendi* with the Institute.

In conclusion, I enclose a copy of a letter (*see* Appendix S., below), addressed by me on the 29th April 1897 to Sir Frederick Abel, in anticipation of the publication of this Report.

I have, &c.,
S. C. BAYLEY.

LETTER from the CHAIRMAN of the SPECIAL SUB-COMMITTEE of the INDIAN SECTION of the IMPERIAL INSTITUTE to Sir FREDERICK ABEL, Bart., K.C.B., IMPERIAL INSTITUTE, S.W.

APPENDIX S. to REPORT of 1896–97.

India Office,
29th April 1897.

My Dear Sir Frederick,

In view of our annual meeting, I write to express my great regret that the report of the work done in the Indian Section of the Imperial Institute during the year ending the 31st of last month, has not yet been printed; for having read it in manuscript, I have found the account given of the work done for India, in every Section of the Imperial Institute, so satisfactory, that I am sure it would have been most gratifying to Lord Herschell to have had a copy before him when preparing his statement to be read before the Fellows of the Imperial Institute on Saturday.

The year under report is the first of the second quinquennial arrangement between the Government of India, the India Office, and the Imperial Institute. The first period was one of tentative organisation, from which few results other than improvements in organisation, were to be expected. Both in India and here we were new to the work, and neither by the authorities of the Imperial Institute nor in India was entire satisfaction felt in the actual work done for India at the Imperial Institute. But this was gradually seen to be owing to defective organisation, and no sooner was the re-organisation of the Research Department at the Imperial Institute completed, and an India Office Committee constituted for the conduct of the business relations between the Government of India, the India Office, and the Imperial Institute, than improvement became apparent in every branch of the work carried on at the Imperial Institute for the Government of India. The Museum section now exhibits samples of every known natural commercial production of India, and of others thought likely to become articles of commercial export from India; and the Government of India is not only keeping up the collections exhibited, but is always extending them in accordance with either popular curiosity or scientific suggestion. Under Mr. Royle's management the Museum is as efficient as any institution of the sort could be. The Commercial Intelligence Department has also, in its relations with the Indian Section, worked satisfactorily; and its usefulness has quite kept up with the demand from the trading public for the information and advice, and general assistance it can give.

But the most striking advance during the year has been in the work accomplished in the Scientific Department, under the direct control of Sir Frederick Abel and Professor Dunstan; and the series of valuable reports received during the year on the chemical examination and analyses of the

various commercial articles submitted for such experimental inquiry by the Government of India, not only justifies the measure of support extended by that Government to the Imperial Institute, but, in my humble opinion, goes far to vindicate the existence of the Institute, without any consideration of the direct work it may be doing for the British Colonies and the United Kingdom. These reports will all be published as an Appendix to the Report for 1896–7 on the Indian Section, which will form a Year Book of the work done at the Institute for Indian commerce, available for general reference.

I will only repeat my regret that I cannot send you a printed copy of the Report with this letter; but you can assure Lord Herschell that when he gets it he will find that I have in no way exaggerated the impression it will make on all who read it. I hope His Lordship will direct that a copy of it be sent to all our Colonies, and to the leading Chambers of Commerce in this country.

I have, &c.,
S. C. BAYLEY.

IMPERIAL INSTITUTE.

INDIAN SECTION.

CURATOR'S REPORT for the Year ending 31st March 1897.

I have the honour to submit the following Report on the work done in the Indian Section of the Imperial Institute during the 12 months ending 31st March last.

2. *Indian Sub-Committee.*—It will be remembered that the Secretary of State for India appointed, from 1st April 1896, a Committee for the administration of the Indian Section. This Committee consisted of the following gentlemen, viz. :—

Chairman.

Sir Steuart Colvin Bayley, K.C.S.I., C.I.E.

Members.

Major-General Sir Owen Tudor Burne, G.C.I.E., K.C.S.I.;
Sir Charles E. Bernard, K.C.S.I.;
Sir George C. M. Birdwood, K.C.I.E., C.S.I.; and
Sir Alexander Wilson, Kt.; with

Mr. J. R. Royle, C.I.E., as Secretary and Curator.

3. *Honorary Members.* — Subsequently, the following Indian officials on furlough in Europe were invited to serve temporarily as honorary members of the Committee, viz. :—

Sir Alfred S. Lethbridge, M.D., K.C.S.I. ;
F. A. Nicholson, Esq., I.C.S. ;
G. W. Vidal, Esq., I.C.S. ; and
H. Thirkell White, Esq., C.I.E.

4. *Meetings held.*—During the year the Committee held one informal preliminary meeting and 11 regular meetings. On one occasion Dr. George Watt, C.I.E., who was at home on furlough, was invited to attend, while Sir Frederick Abel, Bart., K.C.B., and Professor W. Dunstan, F.R.S., were invited on several occasions. The detailed Minutes of these Meetings are printed at the end of this Report.*

5. *Staff under the Curator.*—The staff of the Indian Section under the Curator, as sanctioned by the Committee, consists of the following members, viz. :—

Mr. G. W. Aston (Clerk).
Mr. J. Foster (Senior Attendant).
Mr. F. Posnett-(Junior Attendant).
A. Walker (Boy Messenger, and to assist generally).

6. *Arrears of Work nearly overtaken.*—In consequence of the want of funds during the latter part of 1894 and the whole of 1895, considerable arrears of work in connexion with the collections which had arrived from India had accumulated, but these have now, I am glad to report, been almost entirely overtaken, and the fresh specimens, as they arrive, are now dealt with with very little delay.

7. *Improvement in mode of conducting Work.*—The system inaugurated by the Committee of preparing in advance a budget of the expenditure for the current year on the collections has effected a very great improvement in the mode of conducting the work of the Section, as it has enabled the Curator to plan in advance the most important works to be undertaken, and to carry out each with economy as its turn arrives.

* The Minutes are not reprinted with the present Papers.

8. *Work done in connexion with Collections.*—In addition to preparing for exhibition about 1,184 specimens which had accumulated, 164 cases, containing about 975 new specimens, have been received during the year, and these have nearly all been prepared for exhibition, and are being placed in the show-cases as fast as the labels are completed.

Appendix A. shows the distribution of this year's specimens according to economic groups, and also the total number of specimens (8,769) now contained in the collection.

9. *New Show-cases.*—Five new show-cases, viz., one for sugar, one for bees, wax, and honey, one for a model village, one for fibres, and one at present used for the Bael-fruit collection, have been added to the Exhibition Galleries. Two of these show-cases have been well made, of the best materials, by the carpenters working in the Indian Section, at a decidedly lower price than they could have been obtained for from outside firms.

10. *Completion of Timber Trophy.*—The timber trophy, which contains about 225 index and other specimens of timbers, has been completed, each specimen being partly polished and having its scientific name and numbers written on it.

11. *Work done in Indian Pavilion.*—The specimens of manufactured goods exhibited in the Indian Pavilion and the temporary show-cases in which they are shown had suffered from exposure to the heat of the sun during summer and to fogs and damp during bad weather. More than half of the show-cases and fittings have now been re-lined with cloth where necessary, and generally restored, and the exhibits have been thoroughly cleaned and arranged; the remaining portion will be similarly treated next month.

12. *Show cases in Indian Pavilion.*—But it must be borne in mind that the show-cases at present in the Pavilion are all of a temporary character, not dust-proof nor weather proof, and not suitable for permanently protecting valuable articles, especially with the conditions of temperature and atmosphere which must prevail in an exposed and glass roofed building.

The present show-cases were all cheaply made of deal for use in the Colonial and Indian Exhibition of 1886, and were not intended to last for more than two or three years.

13. *Label Printing.*—One of the first appliances sanctioned by the Committee was a small hand printing-press and type, and this has proved exceedingly useful and economical in label printing. All new specimens now receive neat and uniform printed labels before being exhibited, and old written labels are, by degrees, being replaced; the amount of urgent work to be done, with only a small staff, alone causes delay in the completion of this task.

14. *Articles presented to the Collections.*—The principal articles presented to the Indian Collection during the year have been:—

From Dr. H. Warth.—Blue Corundum from Balarampur; Cutch prepared by vacuum process.

From E. Buckley & Co.—Collection of samples of Indian wool, with market prices.

From the Andaman Forest Department, per Ogilvy, Gillanders & Co.—Gun-carriage wheels and door and panelling of Padauk wood.

15. *Work done in the Sample Store-room.*—In the commercial sample store-room good progress has been made, the surplus portions of all the new specimens having been added to the stores. A new double storage-rack has been constructed of teak by the carpenters working in the Section, and this is now completely filled with samples.

Improved storage-cases divided into suitable bins or racks for fibres have also been fitted up along one side of the store-room.

If the collection continues to grow at the same rate as during the past year, some of the additional storage space, which was originally allotted to India, but afterwards given to Colonial Sections, will shortly be needed.

16. *Loan Collections to Exhibitions.*—During the year collections have been prepared for the Cardiff Exhibition and for the Salvation Army Exhibition. A

collection is now being prepared for the Imperial Victorian Exhibition at the Crystal Palace.

17. *Collections to illustrate Lectures.*—Collections of samples have also been prepared to illustrate lectures delivered at the Imperial Institute by Professor Dunstan, F.R.S., by Professor Church, F.R.S., and by Professor Hummel; also for several lectures given at the South Place Institute, Finsbury.

18. *Samples issued to the Scientific Departments or to Experts.*—A very important part of the work of the Section has consisted of the issue of samples to the Scientific Department of the Imperial Institute and to outside experts. In the majority of cases the samples have been received in bulk from the Reporter on Economic Products to the Government of India for the express purpose of being examined and reported on; but in some instances applications for samples for examination and comparison have been received from scientific and commercial men in England and on the Continent, and these have been complied with whenever possible.

The following are the principal samples issued, viz.:—

Economic Group.	No. of Samples issued.
Food substances	6
Narcotics	92
Drugs	11
Gums and resins	14
Dyes and tans	126
Fibres	42
Miscellaneous	66
Total	357

19. *Reports from the Scientific Department.*—As a rule, the Secretary of the Imperial Institute has forwarded all reports by the Scientific Department to India under flying seal through the India Office.

20. *Report on Tobacco.*—In the case of a consignment of tobacco recently received from Dr. Watt, C.I.E., a report on the chemical constituents was prepared by the Scientific Department, while the opinions of experts concerning the commercial value were obtained and summarised by the Curator, who also disposed of the consignment and remitted the proceeds to India. The complete report has been forwarded to Dr. Watt, and a copy is appended. (*See* Appendix B.)

21. *Commercial and General Inquiries.*—The number of inquiries made by visitors, or by post, on matters connected with Indian produce or manufactures, has rather diminished than increased. Probably this is partly due to the fact that many questions addressed to the Imperial Institute are now referred to, and answered by, the Commercial Intelligence Department, and partly to the fact that business men can rarely spare time to come so far from the City to inspect samples and ask questions.

Among the most interesting inquiries and applications are the following, viz.:—

(*a.*) A City firm has sent the Curator a collection of sinnet plaits and braids, suggesting that a supply of such braids—for which there is a good demand—should be sent from India. Dr. Watt is endeavouring to comply with the suggestion.

(*b.*) A City firm has asked for a supply of *Sansevieria zeylanica* fibre in order to test its commercial value.

(*c.*) A supply of *Phœnix rupicola* seeds for cultivation has been obtained for a London firm.

(*d.*) Two "replicas" of gold-enamelled lockets, and a "replica" of a large silver centre-piece, have been procured from India for visitors.

(*e.*) Information concerning the mica trade, and concerning india-rubber supplies has been procured from India.

(*f.*) A London firm has asked for steatite specimens and information to assist them in procuring a regular supply from India.

(*g.*) A firm has asked for test samples of corundum and of garnet sand for crushing, in order to see if suitable supplies can be obtained from India.

(*h.*) A City firm has asked to be placed in communication with an Indian firm able to ship supplies of white linseed like the samples shown in the Indian Section.

(*i.*) Another firm has asked for supplies of certain fibres in order to endeavour to create a demand for them in the fibre market; but as they coupled their application with the condition that similar samples were to be shown to no one else for at least twelve months, the Committee could not see their way to helping.

22. *Correspondence.*—Correspondence now passes regularly between the Reporter on Economic Products and the Secretary to the Indian Sub-Committee on all matters connected with the collections. Correspondence also passes "under Flying Seal" between the Reporter on Economic Products and the Secretary and Director, Imperial Institute, on matters connected with the examination of products, and printed copies of these letters are now forwarded from India and filed in the Indian Section. A list of the Flying Seal correspondence which has passed during the year is appended. (*See* Appendix C.) A selection of the more important Flying Seal letters between Sir Frederick Abel and Dr. George Watt is printed in Appendix C., No. 2.

J. R. ROYLE,
Secretary Indian Sub-Committee and
Curator Indian Section.

2nd April 1897.

Financial Statement.

Estimated Expenses for the Year 1896–7.

	£	s.	d.	£	s.	d.
Heading A.—Salaries of Curator's Staff:—						
1 Clerk and two attendants at 3*l.* 14*s.* per week	192	8	0			
Occasional extra help	7	12	0			
				200	0	0
Heading B.—General Expenses of Indian Section:—						
Petty cash, at 5*l.* monthly				60	0	0
Tins, bottles, jars, &c., for specimens	36	14	9			
New show cases	51	0	0			
Completing timber trophy, polishing, writing names, &c.	13	10	0			
Working up and polishing new timber	5	0	0			
Glass for photograph frames	5	0	0			
Recovering or painting fittings in pavilion	15	0	0			
Labels, printing, &c.	10	0	0			
				136	4	9
Tins for storage of surplus samples	34	4	9			
1 new storage rack	20	0	0			
				54	4	9
Office fittings				20	0	0
Margin for contingencies				90	0	0
Total of Headings A and B				560	9	6
Heading C.—Contributions to Imperial Institute:—						
Annual grant for general purposes of Institute				750	0	0
Annual grant for scientific investigations				100	0	0
Heading D.—Curator's salary				500	0	0
Total				£1,910	9	6

Estimated Expenses for the Year 1897–8.

	£	s.	d.	£	s.	d.
Heading A.—Salaries of Curator's Staff:—						
1 Clerk, at 60*l.* per annum	60	0	0			
Senior Attendant, at 34*s.* weekly	88	8	0			
Junior Attendant, at 26*s.* weekly	67	12	0			
Boy Messenger, at 8*s.* 6*d.*	22	2	0			
Occasional extra help	9	18	0			
				248	0	0
Heading B.—General Expenses of Indian Section:—						
Petty cash, at 5*l.* monthly				60	0	0
Tins, bottles, jars, &c., for specimens	17	0	0			
Two new show cases	64	0	0			
Cleaning and lacquering brass ware	8	0	0			
Renovating show cases	9	0	0			
New cloth and fittings for pavilion	7	0	0			
Carpenters' and painters' wages	10	0	0			
Paint, spirits of wine, labels, cleaning materials	10	0	0			
				125	0	0
Tins for storage of surplus samples	13	0	0			
New storage rack and improvements	25	0	0			
				38	0	0
Office fittings				15	0	0
Margin for Contingencies				64	0	0
Total of Headings A and B				550	0	0
Heading C.—Contributions to Imperial Institute:—						
Annual grant for general purposes of Institute				750	0	0
Annual grant for scientific investigations				100	0	0
Heading D.—Curator's salary				500	0	0
Total				£1,900	0	0

APPENDICES to Mr. J. R. ROYLE'S Report.

APPENDIX A.

Statement showing number of Specimens received in Indian Section between 1st April 1896 and 31st March 1897.

Name of Group.	No. of Specimens.	Remarks.	
Dyes and Tans	324	Number of specimens exhibited up to 31st March 1896	6,866
Gums and Resins	53	Number of specimens which had accumulated, dealt with during current year	1,184
Food Stuffs	57	Ditto, received during current year	975
Narcotics	133		9,025
Oils and Oil-seeds	87	Number of old specimens eliminated from the collection	256
Fibres	141	Total number of specimens exhibited 31st March 1897	8,769
Minerals	63		
Miscellaneous, Index Collection	99		
Photographs	18		
Total number of exhibits received since 1st April 1896	975		
Total number of cases received since 1st April 1896	164		

APPENDIX B.

Report on Tirhoot Tobacco.

In October 1896 a package of bright leaf tobacco, grown at the Pioneer Tobacco Factory in the district of Tirhoot, was received in the Indian Section of the Imperial Institute from Dr. George Watt, C.I.E., "Reporter on Economic Products to the Government of India."

Dr. Watt had received the consignment from Messrs. Begg, Dunlop & Co., the growers, with a request that a report as to its commercial value and chemical constituents might be obtained.

The package was delivered at the Imperial Institute unopened, and was there examined by the Custom House authorities and left in bond.

Seven 4-lb. samples were permitted by the Customs to be drawn from different parts of the package, and these were sent to various firms for the purpose of obtaining their opinions.

The subjoined Table (*see* page 20) gives the names of the firms consulted, together with a brief summary of their reports, and the reports in full are given in Appendix 1.

A small quantity was also retained for exhibition purposes, and a sample was sent to the Scientific Department of the Imperial Institute for examination there. A copy of the report thereon by the Director, Professor W. R. Dunstan, F.R.S., is appended. (Appendix 2.)

It will be observed that the various reports, while differing in some details, are not very satisfactory.

One firm considers this tobacco "a decided improvement on any Indian tobacco hitherto handled," but nearly all concur in finding fault with the want of flavour, and with the large size of the midrib. The general opinion appears to be that this Tirhoot is only suitable in its present form for cutting or pipe tobacco, mixed with other tobaccos, to reduce the cost of the mixture.

Messrs. Thomson and Porteous, in their report, point out that the stems and stalks weigh fully one-fourth of the leaf, and that to strip it in this country would add to the cost; they consider, as they have previously stated when reporting on Indian leaf tobacco, that the value in this country would be much increased if the leaves were stripped and stemmed in India; in this form they would occupy a fair position as competitors with the American "stripts," which at present command the market. They also consider that if the growers can improve the quality, colour, and flavour, this tobacco if sent as "stripts" would command a much higher price than that at which they now value it. Messrs. Thomson and Porteous send various samples of the tobacco which they have manufactured in various forms, and Mr. James

Names of Firms.	Valuation.	Quality.	Remarks.
Messrs. Clagett, Brachi, & Co., Tobacco Brokers, 8, Billiter Square, E.C.	4*d*., possibly 5*d*., for packages of over 80 lbs. net.	As dry as possible. Flavour innocent. Length and width satisfactory. Burning good.	A decided improvement on any Indian tobacco hitherto handled.
Messrs. Grant, Chambers, & Co., Tobacco Brokers, 37, Fenchurch Street, E.C.	Nominal value 4½*d*. to 5*d*. per lb.	Colour and appearance good; but part is rather dry, and midrib is rather large. Great deficiency of flavour.	Excessively dry and brittle. Looks as if strength had been dried out of it by some process.
Messrs. James Curtis & Co., Tobacco Brokers, 65, Fenchurch Street, E.C.	Nominal; perhaps 3*d*. to 3½*d*. -	Leaf showy looking; lacks flavour. Could not compete with Virginia leaf.	Some years ago they sold similar tobacco at 3*d*. to 3½*d*. per lb., but they were unable to follow on with sales.
Messrs. W. D. and H. O. Wills, Limited, Tobacco Manufacturers, Holborn Viaduct and Bristol.	Possibly 4*d*. to 5*d*. - -	Flavour unpleasant. Lacks quality and substance	The tobacco would be useless to them; a limited market might be found if used in combination with other tobaccos, to reduce the cost of the mixture.
Messrs. Cope Bros. & Co., Tobacco Manufacturers, Liverpool.	Doubt if ready sale could be found	Size and texture of leaf good average. Stem and veins rather large. Percentage of sand much above that of American tobacco.	Only suitable for pipe tobacco; sample appears only partly cured; smokes hot, black, and with bitter after-taste.
Messrs. Thomson and Porteous, Tobacco Manufacturers, Edinburgh.	3*d*. to 4*d*. - - -	Flavour, quality, and colour good; in smoking does not taste equal to American.	Stems and stalks too heavy, weighing fully one-fourth of the leaf. If sent as "stripts" value might be raised to 5*d*. to 6*d*. per lb. They send manufactured samples.
Mr. James T. Bell, Tobacco Manufacturer, Glasgow.	Not given - - - -	Condition excellent. Handling good. Flavour weak.	Only fit for cutting. Would only compete with nondescript Burley and being a substitute would not command the Burley value. Sends manufactured samples and specimen Virginia leaves for comparison.

Bell does the same, as well as similar specimens of Virginia tobacco for comparison, and specimen leaves of bright Virginia tobacco which they recommend should be tried in India.

Portions of all these samples are being forwarded to India and the remainder retained in the Indian Section here.

Professor Dunstan's Report, showing the amount of moisture, ash, sugar, and nicotine contained in the tobacco has already been separately forwarded to India, but a copy is now appended in order that it may be kept on record, together with the Commercial Reports.

Having been instructed to dispose of any portion of this tobacco which was not required for the purposes of valuation, analysis, and exhibiting, I applied to the brokers from whom reports had been received, but was unable to get a higher offer than 3½*d.* per lb., and this offer was contingent on the tobacco being admitted by the Customs at the lower rate of duty, viz., 3*s.* 2*d.* per lb. On this point there was at first some doubt, as, in order to be admitted at that rate, tobacco must have more than 10 per cent. of moisture, all below that per-centage paying 3*s.* 6*d.* per lb.

Professor Dunstan's analysis showed only 9 per cent. of moisture in the small samples submitted to him.

A second examination was therefore required, and from this it appeared that the small samples drawn for examination and valuation had become much drier than the bulk, on account of the warmth and dryness of the Indian sample room where they were stored for a short time; the bulk was consequently allowed to pass at the rate of 3*s.* 2*d.* per lb.

Messrs. Clagett, Brachi & Co., who disposed of the package of tobacco, explain the difference between their first valuation and the price realised by the fact that their valuation of 4*d.* to 5*d.* was given for ordinary untouched packages arriving in the usual way in the Docks, and equal in condition to that of steam-dried American tobacco, *i.e.*, containing about 11 per cent. of moisture. In Appendix (3) are given for the sake of comparison, the market prices on 1st March of various kinds of tobacco.

The following are the details of the weight of the package:—

Gross weight of the package on 19th February 1897, 5 cwt. 0 qrs. 5 lb.

	Lb.
Net weight for duty, 4 cwt. 0 qrs. 2 lb.	450
Four 7-lb. samples drawn	28
	478

	Lb.
Net weight of tobacco as invoiced	490
„ „ for duty and samples drawn	478
Weight lost since being in bond	12

Messrs. Clagett, Brachi & Co.'s account for the sale is as under:—

10th March 1897.

1 Package Calcutta leaf tobacco, at two months' prompt.—

	Lbs.		£	*s.*	*d.*
Weighing	450				
		4 per package.			
	446				
	17	4 lbs. per 104 lbs.			
	429	nett, at 3½*d.* per lb.	6	5	2
Discount 1 per cent.			0	1	3
			6	3	11
Brokerage			0	5	0
			5	18	11
Less two months' discount for cash			0	0	11
			5	18	0

A draft on Calcutta for Rs. 94. 0. 3, being the equivalent of 5*l.* 18*s.*, has been remitted to the Reporter on Economic Products.

For purposes of comparison the market prices of various kinds of tobacco are appended. (*See* Appendix 3.)

J. R. ROYLE,
Secretary Indian Sub-Committee and
Curator Indian Section, Imperial Institute.

20th March 1897.

Appendix 1 to Appendix B.

Commercial Reports.

No. 1.

Report on Indian Bright Leaf Tobacco received from the Indian Section, Imperial Institute.

8, Billiter Square, London, E.C.,
9th December 1896.

Type of tobacco leaf.—A decided improvement on any Indian tobacco which we have ever handled.

Condition.—Perfect (as dry as it is possible to make it).

Flavour.—Innocent.

Length and width.—Satisfactory.

Burning.—Good.

Colour.—Semi-bright Virginia like.

Value.—Very nominal, similar Virginia is worth 5½*d.*—6*d.*, but has more flavour than the Calcutta, of which none has been in the market for years. We think 4*d.*, possibly 5*d.*, will be obtainable for packages of over 80 lbs. net (500—600 lbs. each is a suitable weight) and for small lots of 5—20, if equal to type and as dry.

CLAGETT, BRACHI & Co.

J. R. Royle, Esq., C.I.E.

No. 2.

Report and Valuation of sample of Tobacco *ex.* "Golconda," Calcutta, received from the Imperial Institute, Indian Section.

37, Fenchurch Street, London,
11th December, 1896.

The colour and general appearance are good, except that a part is rather dingy, and the midrib is rather large. There is, however, a great deficiency of flavour. The tobacco is excessively dry and brittle, and it looks as if the strength had been dried out of it by some process. Nominal value 4½*d.* to 5*d.* per lb.

GRANT, CHAMBERS, & Co.

J. R. Royle, Esq., C.I.E.

No. 3.

Indian Leaf Tobacco.

65, Fenchurch Street, London, E.C.,
7th January, 1897.

Dear Sir,

We must apologise for having left the matter of the Indian leaf tobacco over so long, the holidays intervening since receipt of your sample must be our excuse.

Some years ago we handled tobacco of this class (for Messrs. Begg, Dunlop, & Co.), and effected a few small sales at 3*d.* and 3½*d.* per lb., but were unable to follow on with sales.

The leaf, by the sample before us, is showy looking, but it lacks flavour; and, in the present state of our market, it could not compete with Virginia leaf. Would you like us to return the sample to you?

We remain, &c.,
JAMES CURTIS & Co.

J. R. Royle, Esq., C.I.E.

No. 4.

Indian Tobacco.

Holborn Viaduct, London, E.C.,
14th January, 1897.

Dear Sir,

We very much regret that we have not been in a position to forward you a report *re* this matter earlier. We have manufactured the tobacco in various ways, and now have pleasure in sending you a cob of Bird's Eye for your inspection.

We regret that we have not been able to form a very good opinion of the quality of this tobacco. The flavour, when smoked, is anything but pleasant, and we find that it lacks quality and substance, which are important points in the satisfactory manufacture of tobacco. As far as our own manufactures are concerned, the tobacco would be quite useless to us. We think, however, that possibly a limited market for it might be found, as, though it would not give a satisfactory result by itself, it might be used in combination with other tobaccos to reduce the price of the manufactured article, but this would only be in small quantities.

Should you contemplate importing tobacco of this grade we should strongly advise you to do so at first only in very small quantities, say not more than half-a-dozen bales, as manufactures of any standing are always rather chary in adopting any tobacco with the qualities of which they are not perfectly familiar.

During the past 30 years special attempts have been made to introduce new growths of tobacco, notably "Akyab," which is somewhat similar, and "Aracan," which is put up in much the same way as Manila, but all these attempts have been attended with failure. Our Bristol house have not returned us the portion of the sample which we sent them down, so we take it that they have used it up in experiments.

We have, &c.,
W. D. and H. O. Wills, Limited.,
A. J. HAMILTON WILLS (Director).

J. R. Royle, Esq., C.I.E.

P.S.—We do not think this tobacco if imported into England would fetch more than 4*d.* or 5*d.* in the market.

No. 5.

Indian Leaf Tobacco.

Liverpool,
18th January, 1897.

Dear Sir,

We regret that, owing to the holiday season, which is an exceptionally long time with us, our Report on the leaf sent by you has been delayed. We now, however, beg to say that—

I. The leaf would come under the heading of pipe tobacco, and would be suitable for no other purpose.
II. Size and texture of leaf is good average.
III. The stem and veins are rather large, indicating coarseness.
IV. The percentage of sand is much above that of American tobacco.
V. We consider that there is a possibility of good workable tobacco being produced in the district, but the sample sent appears to be but partly cured, and has a tendency to smoke hot, black, and with a somewhat bitter aftertaste. In the present state we doubt whether

it would find a ready sale in England, but doubtless it may be improved.

Thanking you very much for the chance of inspecting the tobacco,

We remain, &c.,

COPE BROTHERS & Co., Limited,
THOMAS H. COPE (Director).

J. R. Royle, Esq., C.I.E.

No. 6.

Report on Indian Leaf Tobacco.

105–107, Leith Street, Edinburgh,
16th January, 1897.

On receipt of the 4-lb. sample of Bright Indian Leaf, which you forwarded to us on the 15th December last, we examined the same, and also manufactured the larger portion, and now report as follows :—

The flavour, quality, and colour of the leaf we consider to be good, but in smoking it does not taste equal to the American. The value of it we may estimate at 3*d.* to 4*d.* per lb. The "*stems*" or "*stalks*" are very large and heavy, and form a most decided objection to its sale in this country. They weigh fully *one-fourth* of the leaf, and to strip it or take out the stalks in this country would add to its cost. To make plain what we mean we would put it thus :—

		s.	*d.*	
The price of the leaf, say -	-	0	3	per lb.
The duty thereon -	-	3	2	,,
		3	5	,,
Add ¼ for stalks. -	-	0	10	
			s. *d.*	
	=	4	3	per lb.
Less value of stalks -	-	0	8½	,,
	Say	3	6½	,,

We can use very little of the stalks, and they are troublesome to dispose of. If the Indian growers could be induced to learn the *art of stripping the leaf*, that is, taking out the stalks, "*stemming it*," as they say in America, it would raise its value in this country to 5*d.* or 6*d.* per lb.

The American growers and stemmers are fully alive to the importance of stemming the leaf for this country, and can do it well. If Indian growers wish to have a place in our markets and a good price for their article, they must learn the method of making their leaf into "*stripts.*" The leaf as per sample submitted to us, with so large a stem in it, would have a very small sale in this country, but in the form of stripts it would then occupy a fair position as a competitor with the American product. At present with their stripts the Americans command the tobacco market in this country. If you could persuade those parties in India who are interested in finding a market for Indian tobacco to start the process of stemming, they would soon improve in the art, and in a short time they would find it pay them for their labour. We send you to-day, per Globe Express Company, one box containing two or three "hands" or springs of the leaf, and the following articles which we manufactured out of it, to test its working qualities :—

	Lbs.	Ozs.
Light brown mid. roll - - -	1	2
Two plugs carrotte - - -	0	7½
Shag, cut, bright - - -	1	0
Two sticks nailrod - - -	0	4
Stalks - - - -	1	2
	3	15½

It is a little more difficult to work than American, but, as you will see from the specimens we send you, in its appearance it makes a fair article in *roll*, *cake*, or *cut*.

We repeat, as the deliberate conclusion we have arrived at after examining and working the said leaf, that if it were made into "stripts" in India, it would find a market in this country at a moderate price. If the growers can improve the *quality*, *colour*, and *flavour*, it would as "stripts" command a much higher price than we have indicated.

THOMSON AND PORTEOUS.

J. R. Royle, Esq., C.I.E.

No. 7.

43, Brunswick Street, Glasgow,
26th January 1897.

Dear Sir,

I now send you my report on the Indian tobacco. The tobacco (Burley) is a type grown in Mason County, Kentucky; "nondescript Burley" refers to Burley grown in other districts of Kentucky. I shall be glad if this report will meet your view. Any information further, please let me know.

Yours truly,
JAMES T. BELL.

J. R. Royle, Esq., C.I.E.

Indian Leaf Tobacco.

Commercial sample of leaf tobacco, growth of India, submitted to me for examination. Undernoted are my observations and opinion from a tobacco manufacturer's point of view.

JAMES T. BELL.

27th January 1897.

Commercial condition.—Excellent.

Handling.—Good.

Appearance.—Not unlike nondescript Burley leaf.

Size.—Fair length.

Texture.—Thicker and more elastic than Burley.

Colour.—Dull cinnamon brown.

Flavour.—Weak.

This tobacco would only compete with nondescript Burley in the markets of the United Kingdom, and being a substitute, would not command the Burley value, and could only be used for cutting.

The tobacco has been manufactured into various products:—

1. Cut tobacco.
2. Tobacco for cigarettes.
3. Birds-eye.
4. Cigarettes.

Samples of each are now sent. As a comparison, we send our Virginia in the same style.

Would suggest that Bright Virginia Leaf should be tried in India, and send specimen leaves with leaves of the Indian sample. The difference is very apparent.

J. T. B.

Appendix 2 to Appendix B.

Report by the Director of the Scientific Department of the Imperial Institute on a sample of Tobacco received from Messrs. Begg, Dunlop, & Co., of Calcutta, marked "Tobacco leaves containing less than 7½ per cent. of moisture."

This consignment of tobacco is described in a letter, dated the 4th August 1896, from Dr. George Watt to Mr. Royle. It is stated to be "Bright Leaf Tobacco," prepared at the Pioneer Factory in the District of Tirhoot. The sample consisted of packets, each containing about six or seven fine tobacco leaves; they were pale brown in colour, with a slight aromatic odour and a distinctly sweet taste. The amounts of the following constituents were determined:—

1. *Moisture.*—The amount of moisture, determined by drying for six hours at 100° C., was ascertained to be nine per cent. This is about the usual quantity of water contained in prepared tobacco leaves; the average percentage in fine Virginian leaf tobacco has been recorded as 8·9 per cent.

2. *Ash.*—The amount of ash (mineral constituents) determined on the dry tobacco is 18·67 per cent., of which 84·54 per cent. consists of salts and other mineral constituents soluble in hydrochloric acid, whilst 15·46 per cent., or 2·8 per cent. calculated on the dried leaf, is silica,—that is, sand. It may be added that the ash contained scarcely a trace of sodium salts. These numbers compare very favourably with those obtained in the analysis of various specimens of tobacco. The ash usually ranges between 8 and 20 per cent., the latter number being the average for ordinary samples. Percentages varying from 11 to 18 have been recorded for Virginian leaves.

3. *Sugar.*—The amount of sugar contained in the air-dried leaf is 5·28 per cent., all of which is present in the form of glucose or grape-sugar; no cane-sugar or other similar carbohydrates could be detected.

4. *Nicotine.*—The percentage of nicotine in the dry leaf has been very carefully determined and found to be 2·19 per cent., which corresponds with the quantity found in some of the milder varieties of tobacco, notably those from Havannah and Maryland. The percentage is much lower than that found in many of the stronger and coarser varieties, in which the proportion of nicotine is often as high as from 7 to 8 per cent.

These results show that this sample of Indian tobacco is of excellent quality. It is, however, not possible to arrive at a conclusion as to the commercial value of a specimen of tobacco from the results of chemical analysis alone. It will be necessary to obtain reports from technical experts and dealers in tobacco in this country. Mr. Royle, the Curator of the Indian Section, has already taken steps to obtain such reports. It might, perhaps, be useful if the experts consulted were put in possession of the analytical numbers recorded above. I entirely agree with the suggestion made by Dr. Watt in his letter on this subject as to the desirability of our undertaking to prepare a series of comparative reports on Indian tobacco grown in different districts, and I shall be glad to make arrangements for the chemical part of the inquiry to be conducted in the laboratories of the Scientific Department.

I understand that the remainder of the consignment is to be put up to auction. If this is done, I think it would promote the satisfactory sale of the consignment if a statement of the analytical percentages were included in the description of the sample.

WYNDHAM R. DUNSTAN,
Director, Scientific Department.

Appendix 3 to Appendix B.

London Market Prices of Tobaccos, from Clagett, Brachi, & Co.'s Tobacco Price Current, 1st March 1897.

	Per lb.
Virginia Leaf, common, middling, good, and fine	2½*d.* to 18*d.*
Stripts, common, middling, good, and fine	3*d.* to 15*d.*
Kentucky, common, middling, good, and fine	1½*d* to 8*d.*
Stripts, common, middling, good, and fine	2*d.* to 10*d.*
Maryland and Ohio	3*d.* to 10*d.*
Negrohead and Cavendish	3*d.* to 1*s.* 4*d.*
Columbian	2½*d.* to 5*d.*
Java	3*d.* to 2*s.* 6*d.*
Turkey, Greek, Trebizonde, &c.	3*d.* upwards.
Latakia	2*d.* to 9*d.*
Japan	3*d.* to 8½*d.*
China	3½*d.* to 5½*d.*
Palmyra	5*d.* to 1*s.*
Borneo	8*d.* to 8*s.*
Mexican	6*d.* to 2*s.* 6*d.*
Sumatra	6*d.* to 8*s.*
Paraguay	2½*d.* to 5*d.*
East Indian	1½*d.* to 3*d.*
German and Dutch	3*d.* to 1*s.* 1*d.*
Manilla	7*d.* to 2*s.*
Havannah	2*s.* 6*d.* to 6*s.*
Yara	1*s.* 3*d.* to 2*s.* 6*d.*
Esmeralda	8*d.* to 1*s.* 3*d.*
Seedleaf	5*d.* to 1*s.* 6*d.*
Stalks, duty paid	3*s.* 1*d.* to 3*s.* 4*d.*
Smalls, duty paid	2*s.* 10*d.* to 3*s.* 2*d.*

Appendix C.

Indian Section, Imperial Institute.

Correspondence under Flying Seal since 1st April 1896, between Sir Frederick Abel, Secretary and Director, and Dr. Watt.

(1.) Letters from Sir F. Abel to Dr. Watt.

Date.	Subject.
1896.	
April 15	The cultivation and preparation of jute.
„ 21	Forwarding report on turpentines.
„ 24	Enclosing further report on the examination of jute.
May 4	Asking for further samples of Rubia.
„ 6	Cancelling letter No. 86.
„ 9	An error in the description of Mohpani coal sent for analysis.
„ 13	Forwarding analysis of iron ores.
June 11	Enclosing report on examination of Sanseviera zeylanica fibre.
July 11	Saying that the report on opium is not yet ready.
„ 28	Enclosing a paper on Catechin and Catechu-tannic acid.
„ 28	Enclosing a report by Professor Dunstan on Aconitum heterophyllum.
„ 30	Acknowledging letter *re* publication of analyses of iron ores in "Review of Mineral Production."
Sept. 9	Acknowledging the thanks for the report on Aconites
Oct. 1	Promising to report on certain grains from the extreme North of India (B. Lahoul).
„ 10	Report on three samples of rubber.
1896.	
Oct. 16	Promising to examine Hyoscyamus muticus.
„ 16	Forwarding report on "Myrica Nagi" by Perkin and Hummel.
„ 21	Asking that no further action be taken *re* woods for gun-stocks.
Nov. 11	Enclosing reports on two food grains (Euryale ferox and Perilla ocimoides) and one timber (Pyinma).
„ 28	Preliminary results of Podophyllum investigations by Professor Dunstan.
1897.	
Jan. 1	*Re* the premature publication of report by Professor Dunstan on Jeypore opium.
„ 20	Promising to examine grain of Oryza coarctata.
Feb. 1	Enclosing report by Professor Dunstan on tobacco.
„ 2	Enclosing report by Professor Dunstan on four gums.
„ 3	Agreement as to publication of reports, especially Podophyllum report.
„ 3	Acknowledging "Pharmacographia indica."
„ 3	Will deal with Cicer soongaricum and Lathyrus sativus seeds.

(2.) Letters from Dr. Watt, including a few not marked F.S.

Date.	Subject.
1896.	
March 11	Discussion of the subject of jute investigations.
„ 11	Steps are being taken for the collection of Morinda.
April 14	An error in a list of coals.
„ 15	Acknowledging a report on turpentines.
„ 29	Acknowledging a report on Agave fibre.
March 12	(Not from Dr. Watt, but from Madras Government) *re* Smelting a trial shipment of Salem iron ore.
Dec. 20/95 *et seq.*	Correspondence *re* Sansevieria fibre.
May 6	Advice and description of samples of Cassia auriculata *tan.*
„ 13	Advice of a box of samples of Aconites.
April 1	Advice of 56 lbs. Delphinium Zalil dye.
June 9	List of coals sent from India.
„ 16	Mistake in a name of a coal.
„ 15	Acknowledging a report on jute.
„ 30	Sansevieria fibre.
„ 15	Asking whether reports on Jeypore opium were ready.
July 7	Acknowledging report on iron ores,
„ 7	Seeds of Calotropis procera silk-floss to be examined.
Aug. 11	Advice of more specimens of coal.
„ 11	Sending pamplet on opium specimens.
(Aug. 18)	Acknowledging paper by Professor Hummel on Catechin and Catechu-tannic acid.
Aug. 18	Acknowledging report on aconites by Professor Dunstan and Dr. Jowett.
„ 4	Asking for report on tobacco samples.
July 28	Sending three samples rubber for report.
Sept. 3	Advice of five planks Lagerstroemia timber for gun-stocks.
„ 8	Advice of wheat, barley, and buckwheat from Himalayahs for examination.
„ 15	Hyoscyamus muticus for examination.

Date.	Subject.
1896.	
Sept. 8	Correspondence *re* Mica.
„ 23	Corrections to list of coals.
„ 23	Further notes on Mica.
„ 29	Further corrections to list of coals.
„ 30	Instructions given for the collection of timbers for gun-stocks.
Oct. 28	Giving information *re* reeling of Tussur silk.
Nov. 10	Further corrections to list of coals.
„ 11	Sending 12 photos of opium cultivation.
„ 11	Acknowledging report on india-rubber.
„ 11	Sending "report" and "programme" of Indian collections.
„ 18	Acknowledging report by Professor Hummel on Myrica Nagi dye.
„ 11	Sending samples of Agave Americana fibre for report.
Dec. 8	*Re* publication of Professor Dunstan's report on Jeypore opium.
„ 9	Acknowledging reports on two food grains (Euryale ferox and Perilla ocimoides), and Lagerstroemia timber.
„ 2	Acknowledging letter cancelling the request for timber for gun-stocks.
Nov. 25	India-rubber supply in Assam.
1897.	
Jan. 6	Premature publication of report on Podophyllum.
„ 13	Food grains Cicer soongaricum and Lathyrus sativus.
Aug. 8 and Aug. 18	Cæsalpinia coriaria (Divi divi pods) for analysis.
Jan. —	Oryza coarctata (new food grain) for examination.
Jan. 29	Acknowledging explanation with regard to publication of report on Podophyllum.
Mar. 15	Acknowledging report on four gums.

IMPERIAL INSTITUTE.

SCIENTIFIC AND TECHNICAL RESEARCH DEPARTMENT.

REPORT by the Director, Professor WYNDHAM R. DUNSTAN, M.A., F.R.S., Sec.C.S., on Investigations conducted for the Government of India during the year ending 1st April 1897.

Supplementary to previous reports (Appendices D., E., F.), I have the honour to present to the Indian Committee of the Imperial Institute the report for the last quarter of the year 1896-7 on the investigations of Indian natural products which are being conducted in the Scientific Department of the Imperial Institute. In my last report of 1st March 1897 (Appendix F.), I pointed out that there are at present eight of the staff of Assistant Chemists attached to the Department engaged under my direction in the Laboratories of the Imperial Institute in prosecuting these inquiries.

Indian Aconites.—The investigation of the constituents of the various aconites occurring in India has made considerable progress. The medicinal action of the alkaloids isolated from the plants is being determined, partly by Professor Cash, F.R.S., of the University of Aberdeen, and partly by Dr. F. W. Tunnicliffe, of St. Bartholomew's Hospital.

I have already reported (Appendix G.) on the results of the examination of *Aconitum heterophyllum*, and it is satisfactory to learn that the value of the inquiry has been so highly appreciated by the Government of India. (Agricultural Ledger, 1896, No. 32.)

The "Journal of the Chemical Society" for March 1897 contains an account of the properties of pseudaconitine, the poisonous alkaloid of the aconite of Nepaul (*Aconitum ferox*), by myself and Mr. F. H. Carr, the Salters' Research Fellow in the Laboratories of the Imperial Institute. As a result of the work that has been in active progress during the past year, this will be followed by further papers descriptive of the chemistry of other alkaloids derived from the various aconites. I may add that the paper on the alkaloid of the aconite of Nepaul is the 14th paper of a series of communications by me to the Chemical Society on the general subject of aconite alkaloids.

2. *Investigation of the cause of the variation in the quality of Indian Opium.*—The systematic examination of the numerous samples of crude and refined opium collected in the different opium districts of India at the instance of the Reporter on Economic Products to the Government of India is now nearly completed, and a report on the subject will shortly be presented.

A report (Appendix I.) has already been submitted on the analyses of specimens of opium from Jeypore, and also a memorandum (Appendix H.) suggesting the desirability of inquiry into the methods adopted in producing opium in India, with a view to the production of Indian opium of constant composition, suitable for medical use in this country, where, at present, Turkey opium is almost exclusively employed. The same memorandum also suggested the expediency of inquiry into the methods adopted at the Government Factory in India for the extraction of the valuable alkaloid morphia, with a view to the export to this country of the pure substance for which there exists a large demand.

I have arranged with certain of my colleagues at St. Thomas's Hospital for an extensive trial of the value of Indian opium to be made there as soon as I am in a position to state that its quality is not inferior to that of the Turkey opium now in use.

3. *The Constituents and Medicinal Value of Indian Podophyllum.*—A preiminary report (Appendix J.) has been made on the constituents of Indian podophyllum (*Podophyllum Emodi*), which goes to show that this plant is of at least as great value in medicine as the American *Podophyllum peltatum* which is now almost exclusively employed. The investigation has presented a number of points of difficulty both on the chemical and medical sides, and is not yet completed. Everything that has been done, however, serves to substantiate the conclusion that in this plant India possesses a native drug which

is likely to be of considerable value as an export to this and other countries where at the present time the American drug is so largely used.

In this inquiry also my medical colleagues at St. Thomas's Hospital have rendered me much assistance, especially Dr. H. W. G. Mackenzie, Dr. T. G. Brodie, and Mr. W. Dixon, the Salters Research Fellow in Pharmacology at St. Thomas's Hospital.

4. *The Value of Indian Tanning Materials.*—A large number of experiments have been conducted on various Indian tanning materials during the past year, notably *Terminalia Chebula*, *Acacia arabica*, and *Cassia auriculata*, collected in different districts of India, at different seasons of the year, and, therefore, at different stages of growth. The main purpose of these experiments is to ascertain the comparative value of their tanning properties, and to determine at what period of growth it is most advantageous to collect the raw material. The results of these experiments, which will shortly be reported on, seem likely to be of considerable interest and value.

5. *The value of Indian Fibres and Jute.*—Supplementary to a report already submitted (Appendix K.), further examination is being made of certain Indian fibres, including jute, collected at different stages of growth, so that the value of their fibres may be ascertained, and light thrown on a subject at present little understood, viz., the time at which it is best to collect the jute crop.

6. *Indian Gums.*—A chemical inquiry has been made and supplemented by commercial reports in reference to the value of some Indian gums which are abundant in certain localities, and seem likely to be of service as substitutes for gum arabic or for frankincense. The results have been recently reported upon (Appendix L.).

7. *Indian Tobacco.*—A special sample of Indian tobacco, grown in the district of Tirhoot, and received from Calcutta, has been submitted to complete chemical examination and the results reported (Appendix M.). Arrangements have been made to undertake the analyses of samples of tobacco grown in different districts of India, which are to be collected under the supervision of the Reporter on Economic Products. It is probable that such an inquiry may prove to be of much value to those concerned in the cultivation of tobacco in India.

8. *Indian Coals.*—The laborious task of submitting to chemical examination and practical tests samples of coal representing all the important coal deposits of India is still in progress. It is expected that the work will be concluded and reported on in the course of the present year.

9. *Indian Iron Ores.*—Complete chemical analyses have been made, under Sir F. Abel's direction, of a number of specimens of iron ore, chiefly from the Salem district of Madras. The results have been reported on (Appendix N.)

10. *Indian Food Grains.*—At the instance of the Scientific Department, the well-known authority on this subject, Professor Church, F.R.S., has examined some Indian grains received during the past year (Appendix O.).

11. *Indian Timbers.*—In continuation of previous work, Professor Unwin, F.R.S., of the Central Technical College, has submitted the wood of Lagerstrœmia Flos-Reginæ to mechanical tests (Appendix P.).

12. *Indian Edible Oils.*—The material forwarded to the Imperial Institute through the agency of the Reporter on Economic Products to the Government of India is so abundant that it is impossible with the present staff of the Department to undertake at once the systematic investigation of all the various samples representing a great variety of different products likely to be of economic value. Since it seemed of great importance that a collection of edible oils representing, among others, oils of the Olive, Rape, and Mustard classes, should be chemically examined with a view to ascertain their commercial value, I have arranged with two of my assistants at St. Thomas's Hospital, Dr. A. W. Crossley and Mr. H. R. Le Sueur, B.Sc., who have had special experience in this subject, to conduct the work, under my general supervision, in the chemical laboratory of St. Thomas's Hospital. I have already mapped out the scheme of this investigation, and it has been commenced.

It will be seen from this Report that a very large share of the time and attention of a number of members of the staff of the Scientific Department is being devoted to inquiries undertaken for the Government of India.

As this Report deals with investigations which have been conducted in this recently instituted Department of the Imperial Institute, the Committee may be interested to have before them some account of its aims and organisation. I therefore conclude this Report with the following brief summary taken from a lecture on the Department which was delivered by me at the Imperial Institute on 9th November last, when Sir Joseph Lister (now Lord Lister), President of the Royal Society, occupied the chair :—

"The Scientific and Technical Department of the Imperial Institute has been recently inaugurated in order to provide for the scientific investigation of Indian and Colonial natural products, especially those which are new or little known, chiefly with a view to their utilisation in commerce, in medicine, and the arts, both within the British Empire itself and also in foreign countries. The capacious rooms on the west corridor of the second floor have now been equipped as laboratories, instrument rooms, and sample preparation rooms, to which a small reference library has been added; and a staff of skilled chemists has been appointed to assist in investigating problems relating to the utilisation of natural products of all kinds which have been referred to the Department by the Government of India or by the Colonial Governments.

"The necessary funds for the appointment of a skilled staff adequate for the commencement of operations have been contributed, with far sighted generosity, by the Royal Commissioners of the 1851 Exhibition, who make an annual grant for the purpose, while the Goldsmiths' Company have made themselves responsible for the provision of the whole of the equipment of the laboratories and much of the special apparatus required. Besides this, grants are made by the Government of India towards the expenses of prosecuting Indian inquiries; whilst the Executive Council of the Imperial Institute, in addition to setting aside an annual sum from its general fund, on which there are already numerous and heavy calls (including the enormous sum of nearly 5,000*l.* per annum for Government and parochial rates and taxes), undertakes to defray expenses of a general character, both in respect of equipment and maintenance. The Imperial Government at present renders no pecuniary assistance, either directly or indirectly, to the Department. Gifts of physical and chemical instruments have been made by Dr. Ludwig Mond, F.R.S., and by Mr. George Matthey, F.R.S. The Salters' Company has rendered signal assistance to the undertaking, by founding, in association with the Department, a Research Fellowship of the value of 150*l.*, it being understood that the Salters' Company's Research Fellow shall primarily devote himself to inquiries into the chemistry of medicinal plants of Indian and Colonial origin. In another direction, too, the Salters' Company has assisted the work of the Scientific Department by endowing at St. Thomas's Hospital an additional Research Fellowship, the holder of which is required to devote himself to inquiries into the action of drugs, so that, in this way, the medicinal action and remedial value of Indian and Colonial drugs, which are being chemically investigated in the Scientific Department, may be made the subject of medical and physiological study by the Salters' Research Fellow in Pharmacology at St. Thomas's Hospital. There is so much important work to be done in determining the medicinal value and precise mode of action of both old and new drugs and their constituents, that the need is already felt of further assistance in this direction.

"Provision of the same kind will also be needed for conducting parallel inquiries in economic botany, particularly in the direction of the anatomical study and identification of economic products of vegetable origin.

"It may now be said that there exists, in connexion with the Imperial Institute, the framework of the necessary machinery for making scientific and technical investigations of natural products of every description from all parts of the Empire. But, however numerous the staff of the Department may in the future become, it is unlikely that it will ever be able to cope successfully with the enormous mass of material which present experience shows is likely to be laid before it for investigation.

"There has already been formed in connexion with the Department an external staff of honorary scientific and technical referees, who are high authorities on their special subjects, and who have undertaken to advise the Department on any questions which may be referred to them. The Department has been also fortunate in securing the co-operation and advice of members of the staffs of several of the most eminent public institutions in this country, and particularly of those which are furnished with appliances for undertaking special technical inquiries. Among these may be mentioned the Royal College of Science and the City Guilds Central Technical College, both of which are adjacent to the Imperial Institute at South Kensington, St. Thomas's Hospital, the Pharmaceutical Society, the Royal Indian Engineering College at Cooper's Hill, the Government Laboratories at Somerset House, at the Royal Arsenal, Woolwich, and at the Royal Mint, also the Yorkshire College at Leeds, where much valuable assistance has been rendered by the Research Laboratory of the Dyeing Department, which is endowed and maintained by the Clothworkers' Company. It is hoped that it may be possible greatly to extend this system of external referees on scientific and technical matters, and to secure the co-operation and assistance of the leading scientific and technical institutions, not only in this country but also in India and the Colonies. For while there can be no doubt that it is advantageous that the scientific examination and commercial valuation of Indian and Colonial natural products should in most cases be conducted in the metropolis, still much of the preliminary as well as some of the later operations in connexion with and arising out of these inquiries, might often be conducted in the university and technical laboratories and in the botanical gardens of our Colonies, especially if these institutions were federated with, and were working in association with the Central Scientific and Technical Department at the Imperial Institute. Such a federation, through the Imperial Institute, of scientific and technical workers in all parts of the Empire, could not fail to be an important source of strength to science, industry, and to the nation at large.

"The principal work which the new Department of the Imperial Institute is prepared to undertake when requested by the Indian or Colonial Governments may be summarised as follows:—

"(1.) The scientific investigation of new or little-known natural products derived from India and the Colonies, with a view to their commercial utilisation throughout the Empire.

"(2.) The comparative examination with the same ends in view, of products of recognised value and importance, which, although known to occur or to be producible in India and the Colonies, are at present obtained commercially from other sources.

"(3.) Advising the Indian and Colonial Governments on all scientific questions relating to the production, manufacture, and commercial utilisation of materials occurring within the British Empire.

"In order that the new organisation may be of real utility to India and the Colonies, it is necessary that their Governments, through their recognised representatives in this country, should bring themselves into close communication with the Scientific Department, and be the means of transmitting inquiries and suggestions from their respective Dominions as to the investigations which should be made, and also of reporting to their respective Governments the result of the inquiries and recommendations based upon them.

"It may be useful to allude here to the excellent preliminary arrangements which have already been made by the Indian Government for this purpose; for the example thus set by India will, it is hoped, be followed by at least all the more important of our Colonies. The Government of India has arranged [illegible] information as to the questions demanding attention shall be obtained in [illegible] by a specially appointed officer attached to the Revenue and Agri[illegible]epartment, the Reporter on Economic Products, Dr. George Watt, [illegible]is in constant communication, through the India Office, with the [illegible]tute, and is charged with the collection in India of samples of [illegible]oducts requiring investigation and their transmission to the [illegible]te, together with suggestions as to the points needing

"The arrangements connected with the disposal of these products are made by a special Committee appointed by the Secretary of State for India, which is presided over by Sir Steuart Bayley, K.C.S.I., and consists of Indian officials who are familiar with the needs of India, and the possibilities of promoting Indian commerce, viz.:—Sir Charles Bernard, K.C.S.I., Sir Owen Tudor Burne, K.C.S.I., Sir George Birdwood, M.D., K.C.I.E., and Sir Alexander Wilson. The experienced Curator of the Indian Section of the Imperial Institute, Mr. J. R. Royle, C.I.E., acts as Secretary. To this Committee is temporarily added any official of the Government of India who may be on leave in this country, and is likely to be able to render assistance.

"The Committee is charged with the maintenance and renewal of a thoroughly representative collection in the galleries of the Imperial Institute illustrative of the chief natural products and principal manufactures of India. A similar but more extensive collection is maintained, under the supervision of Dr. Watt, at the Indian Museum in Calcutta. The Committee receives periodical reports from the Director of the Scientific Department of the progress of investigations, and acts as the channel of transmission to India of results and recommendations.

"Now that the Scientific and Technical Research Department has been organised on its experimental side, the Executive Council of the Imperial Institute have in view the perfection of preliminary arrangements that have already been made to bring the results and information obtained by this Department under the immediate notice of merchants and others who control British and foreign markets, and in this matter, too, they will look for active assistance and co-operation from all the Colonies.

"No account of the organisation of the Scientific and Technical Department would be complete without some reference to the part which Sir Frederick Abel, the Secretary and Director of the Institute, has played in this matter. The bringing into existence and into prominence of this side of the work of the Imperial Institute, the importance of which was fully realised by its founders, is mainly due to his enthusiasm, energy, and indomitable courage in the face of numerous difficulties."

1st May, 1897.

WYNDHAM R. DUNSTAN.
Director of Scientific Department.

APPENDICES to Professor DUNSTAN'S Report.

APPENDIX D.

First Quarterly Report to the Indian Committee on Indian Inquiries conducted in the Scientific Department of the Imperial Institute.

I have to report that since July last, inquiries in the following subjects have been completed, and reports transmitted in the usual manner through your Committee to India:—

1. Report on the fibre of *Sansevieria zeylanica.*
2. Report by Professor Hummel on Catechin and Catechu-tannic acid.
3. Report on the alkaloid of *Aconitum heterophyllum.*
4. Report on three samples of India-rubber.
5. Report by Professor Hummel on the constituents of *Myrica Nagi.*
6. Report on samples of opium from Jeypore.

The investigations in the following subjects are now in active progress:—

1. Indian opium.
2. Indian coals.
3. Indian tanning materials.
4. Various species of Indian aconites.
5. *Podophyllum Emodi.*
6. Indian turpentines (by Professor Armstrong).
7. Indian food grains (by Professor Church).
8. Indian dye-stuffs (by Professor Hummel).

With the extended laboratory accommodation and increased staff, I hope to be able very shortly to start several new inquiries, among which I may mention an inquiry into the active principle of Indian hemp, and another into the constituents of an Indian Hyoscyamus.

WYNDHAM R. DUNSTAN,
Director, Scientific Department.

30th October 1896.

APPENDIX E.

Second Quarterly Report to the Indian Committee on Indian Inquiries in progress in the Scientific Department of the Imperial Institute.

I have the honour to report on the inquiries which have been in progress in the Scientific and Technical Departments on Indian products since October last, some of which were alluded to in my last Report, and also to submit some suggestions with reference to future inquiries.

Indian Opium.—A large number of samples of opium from the different opium districts in India, which were received last October, are being submitted to a thorough chemical investigation. Owing to the many analyses which it has been necessary to make, I have been obliged to employ the entire time of two assistants in carrying on this work. It will still be some time before this investigation is completed, but I may mention that the results so far obtained indicate that it is likely to point the way to a considerable improvement in the quality of Indian opium.

Indian Medicinal Plants.—The extension of the difficult inquiry as to the constituents of the various kinds of Indian aconite is being actively proceeded with, and a second paper recording further important information as to the scientific history of the poisonous alkaloid of Nepaul aconite will shortly be ready for publication. The examination of *Podophyllum Emodi*, including the comparison of its medicinal effects with those produced by American Podophyllum, is rapidly approaching completion.

Indian Gums.—A number of samples of gums recently received from India have been submitted to analysis. The analytical results rendered it probable that some of these gums may prove to be useful substitutes for gum arabic and gum tragacanth; specimens have therefore been sent to several experts on gums for opinions as to their present commercial value.

Indian Tobacco.—A special sample of Indian tobacco has been submitted to chemical examination, and the results show that it is of fine quality. The specimen is now being reported on from the commercial point of view.

Indian Coals.—The various samples of Indian coal are being analysed and submitted to practical tests as they are received.

Indian Tanning Materials.—Analyses are being made of the new series of samples of Indian tanning materials, which include specimens of certain plants collected at different stages of their growth.

Indian Jutes.—A series of specimens of jutes collected at different periods of growth is under examination.

Burmese Turpentine.—I think it desirable to draw attention to the fact that the preliminary examination of this turpentine proved it to be of first-rate quality, equal to the best oil of turpentine in the English market. The development of this industry in Burma must now chiefly depend on the abundance of material, facilities for the preparation of the turpentine, and the cost of transport. The attention of those interested should be called to these questions if this has not already been done.

Indian Hemp.—The Department will shortly be in a position to undertake the investigation of the constituents of Indian hemp and their mode of action. The importance of this inquiry being made has recently been emphasized by the Report of the Hemp Drugs Commission. The subject is well known to be a large and difficult one, and, if undertaken in the Department, it will probably be necessary to ask that the additional expense of the investigation should be provided for by the Indian Government. I may mention that both Dr. Prain and Dr. George Watt during their recent visit to England expressed

their strong opinion as to the advisability of this investigation being commenced, and having considered the matter very fully, I am now in a position to state that the following special materials will be needed, most of which will probably have to be specially collected in India:—

1. Charras, resin, from 5 to 6 pounds.
2. Ganja, round and flat, 56 pounds of each.
3. Bhang (from wild plants)—
   (*a*) from female plants } 4 to 5 pounds of each.
   (*b*) from male plants }
4. Specimens of Ganja sealed up by Dr. Prain in the store at Calcutta, (*a*) one year old, (*b*) two years old, (*c*) three years old.

Manufacture of Opium Alkaloids in India.—I have already drawn attention to the importance of this subject being investigated by the Department with a view to improving the methods at present adopted in the extraction of opium alkaloids; and on a previous occasion I asked to be supplied with materials and information, but I have not yet heard whether any steps have been taken in the matter.

WYNDHAM R. DUNSTAN,
Director, Scientific Department.

7th January 1897.

APPENDIX F.

Special Report to the Indian Committee on the Investigations now being conducted for the Government of India in the Scientific Department of the Imperial Institute.

In connection with the application alluded to in my Quarterly Report of 7th January last, for an additional grant to defray the expenses of the proposed inquiry into the constituents of Indian hemp, I beg to submit, at the request of the Indian Committee, the following statement showing the various inquiries relating to Indian products which are now being conducted in the laboratories of the Scientific Department.

1. A systematic examination of Indian tanning materials.
2. Examination of jute and other Indian fibres.
3. Investigation of the constituents and medicinal value of the Indian aconites.
4. Investigation of the constituents and medicinal value of Indian Podophyllum.
5. Examination of various Indian gums.
6. Examination of Indian tobacco.
7. Systematic investigation into the cause of the variations in the quality of Indian opium, involving analyses of samples of opium from each of the opium districts of India.
8. Analyses and practical tests of Indian coals.

These inquiries take up the entire time of eight skilled assistants who are engaged under my direction in conducting the requisite analyses and other experimental work. These assistants receive stipends amounting in all to a total of 550*l.* per annum. This sum does not include the expense of apparatus and materials required in the investigations, nor does it include that incurred for menial service.

It will thus be clear that the annual grant of 100*l.* made to the Scientific Department goes but a very short way towards defraying the expenses of the Indian inquiries now in progress, and it has become necessary to ask for an additional grant to cover the expenses of the Indian hemp investigation. I may add that it will probably be necessary to make application for further assistance in respect of any other considerable enquiries which the Government of India may ask us to undertake in the future.

WYNDHAM R. DUNSTAN,
Director, Scientific Department.

1st March 1897.

Appendix G.

Report on Aconitum heterophyllum.

A very thorough examination of the constituents of Aconitum heterophyllum, supplied from the Indian collections of the Imperial Institute, has been conducted under my supervision by Dr. H. A. D. Jowett.

The principal alkaloid was partially described by Broughton in 1873 and named by him "atisine." The formula assigned by Broughton to this alkaloid was $C_{46}H_{74}N_2O_5$. In 1879 Wasowicz confirmed and extended Broughton's results, but shortly afterwards Alder Wright stated that atisine should be represented by the formula $C_{22}H_{32}NO_2$. It was with the view of settling the question of the composition and characteristics of this alkaloid, and of comparing its chemical relationships and properties with those of the alkaloids derived from other species of aconite, that the present enquiry was undertaken. The results of the investigation, which will shortly be published in the "Journal of the Chemical Society," may be summarised as follows:—

Atisine is an uncrystallisable base represented by the formula $C_{22}H_{31}NO_2$. It is laevo-rotatory, and furnishes crystalline salts, several of which have been prepared and their properties described. The alkaloid is non-poisonous in small doses and therefore differs from the chief alkaloids of the other principal species of Aconitum, viz., *Aconitum Napellus*, *A. ferox* and *A. japonicum*, and it is clear from the behaviour of atisine towards chemical re-agents that its chemical structure is very different from that of these other aconite alkaloids,—all of which, I may add, are at present being investigated and compared by me and my assistants. In future, this inquiry will be conducted in the Research Laboratories of the Imperial Institute. The reports hitherto received from India as to the medicinal effects of A. heterophyllum do not furnish much ground for hope that this plant will prove of great value. I intend, however, to have therapeutic experiments made with the pure alkaloid atisine as soon as the fresh consignment of roots, now on its way, has been received from India, and a further supply of this alkaloid has been extracted from them. The results of Dr. Jowett's investigation of the constituents of this plant have formed the subject of a thesis presented by him to the University of London, which has gained for him the Degree of Doctor of Science. A copy of this thesis is sent herewith.

Wyndham R. Dunstan.

25th July 1896.

Appendix H.

Memorandum on Indian Opium.

The review of the correspondence relating to the collection of opium specimens, which has been issued by Dr. Watt in a paper that has just reached me, makes it desirable to postpone the Report on the examination of the Jeypore specimens and on the general subject of Indian opium which I have nearly completed. I was not aware that such an extensive series of specimens were on their way from India, and I had suggested in my report the desirability of forming such a collection, and of sending information as to methods of preparation and on other points, many of which are dealt with in the correspondence.

So far, only the specimens of opium collected in Jeypore have reached this country, and I have completed the examination of these (Appendix I.). The Jeypore specimens should again be considered in connection with the other samples which will shortly arrive, of which the specimens from Jeypore form only a small part. As a matter of fact, the analyses of these specimens bear out the results of former analyses of Indian opium in showing that the percentage of morphine is relatively lower, and that of narcotine higher, than the percentages of these alkaloids occurring in the average specimens of

Turkey opium. It remains to be determined how far these differences can be accounted for by differences in the varieties of the poppy, and in the methods of preparing opium which are followed in India.

My purpose in writing this memorandum is to ask for further information suggested by a consideration of the correspondence, and on certain other matters not dealt with in it which have arisen in connection with the examination of the Jeypore specimens.

In the paragraph introductory to the correspondence, mention is made of the "Report of the Chemist," and throughout the correspondence allusions occur to the analyses he will make. The name of the chemist is not given, nor is it stated how soon his report will be forwarded. It is important that this report should reach me as soon as possible, since if determinations of morphine and of other alkaloids have been made, and an account is given of the method used for their determination, it may be unnecessary for me to repeat all the analyses, and I shall be more free to attack other problems connected with the subject as well as those arising out of the analytical results. It is clear that the investigation of the numerous scientific questions relating to the production of opium in India and the value of Indian opium, as compared with Turkey opium, for medical use and for the manufacture of alkaloids, will occupy much of the time and attention of the staff of the Scientific Department of the Imperial Institute during the next year, and, in order that this inquiry may be made as complete as possible, I should be glad to be furnished with the additional information and specimens detailed below.

1. Copies of the "Opium Manual," of the annual reports on the opium cultivation in India, and with other official literature relating to the cultivation of opium and the manufacture of alkaloids from it.

2. Thirty or forty pounds of medicinal opium, containing not less than 8 or 9 per cent. of morphine as free as possible from colouring matter, so that I may have trials made, at St. Thomas's Hospital during the next year, of its therapeutic value, and obtain reports from my medical colleagues on its medicinal effects as compared with those obtained from the Turkey opium which has hitherto been employed.

3. Commercial specimens of morphine and other alkaloids manufactured from opium in India, together with accounts of the processes employed in their manufacture, so that I may be able to compare the alkaloids of Indian manufacture with those manufactured in Germany and elsewhere which are now on the English market, and, if necessary, advise on the improvement of the Indian methods of manufacture. Morphia is now more largely employed in medicine than opium, and if it is produced of a quality not inferior to that at present in the English market, there seems to be no reason why the manufacture of morphia and other opium alkaloids in India and their sale in this country should not be a profitable undertaking for the Indian Government to engage in, either directly or indirectly. I am aware that morphine manufactured in India is sent to this country, but I understand that so far its sale has presented obstacles which I think there should be no difficulty in overcoming.

WYNDHAM R. DUNSTAN.

1st September 1896.

APPENDIX I.

Report on Opium from Jeypore.

The following results have been obtained from the analysis of the series of specimens from Jeypore (F.S.S. 24th September 1895). The amount of morphine and of narcotine has been estimated. For the estimation of morphine the method of Flückiger has been used, and supplemented by titration of the alkaloidal residue. It is to be noted that if the processes described by the British Pharmacopœia for the estimation of morphine had been followed, the

percentages of morphine would be represented by about one per cent. higher than those given in the table below:—

Specimen labelled.	Morphine.	Narcotine.
	Per cent.	Per cent.
"White" - - -	5·0	4·5
"Soosni" - - -	5·7	5·6
"Gulabi" - - -	4·6	6·5
"White and pink" - -	7·2	7·1
"Red" - - -	7·75	7·1

The British Pharmacopœia states that medicinal opium should not contain less than 10 per cent. of morphine. It will be seen that none of the Jeypore specimens reach this standard, even when the percentages are increased by one per cent. to correspond with the higher results afforded by the process of the British Pharmacopœia; moreover, in determining the value of opium for medical use, regard must also be had to the percentage of narcotine, an alkaloid of little or no value for most of the purposes for which opium is administered. Now, Turkey opium, which is most esteemed for medicinal use, contains about 2 to 3 per cent. of narcotine, and although my experience is that the amount of this alkaloid contained in any commercial specimens of Turkey opium is subject to considerable variation, amounting in some cases to as much as 5 per cent., the comparative richness of the Jeypore specimens in this constituent may considerably detract from their value for medical use, whilst the relatively small percentages of morphine would also probably render them of little use for the manufacture of the valuable alkaloid morphine. At present, I am not able to form an opinion as to the cause of the deficiency in morphine and the richness in narcotine of Jeypore opium. It may be due to the employment of a variety of poppy differing from that from which Turkey opium is produced, or it may be the result of an unsatisfactory process of manufacture, whereby some of the morphine is lost. I have not yet been informed as to the method which is used in preparing this opium; in future, great care should be taken to include the whole of the exudation, and to prevent loss of material in any part of the operation.

In view of the fact that the samples labelled "white and pink" and "red" contain more morphine than is commonly supposed to exist in Indian opium, and that the whole subject of the production and quality of Indian opium is now engaging the attention of the Scientific Department of the Imperial Institute, I recommend that the cultivation of the poppy in Jeypore should be continued, and that another set of carefully prepared samples of the opium should be sent to the Imperial Institute for analysis.

WYNDHAM R. DUNSTAN.

10th September 1896.

APPENDIX J.

Preliminary Report on Indian Podophyllum.

A complete examination is now being conducted in the laboratories of the Scientific and Technical Department, of the constituents of the Indian plant *Podophyllum emodi*, with the object of ascertaining how far its constituents resemble those of the well-known American drug *Podophyllum peltatum*, from which the resin called "podophyllin" is obtained and largely employed as a medicine in this and other countries. The inquiry is not yet completed, but it may be useful at this stage to give some account of certain of the results obtained, which seem to point to the conclusion that Indian podophyllum is an important drug, whose constituents are the same as those of the American plant. It produces similar medicinal effects to those of *Podophyllum peltatum*, whilst the Indian plant appears to furnish a larger percentage of the valuable resin. The investigation was commenced in the Research Laboratory of the

Pharmaceutical Society, and has since been carried out in the Laboratories of the Imperial Institute.

The resin "podophyllin" was first prepared from the Indian root (rhizome) by the process of the British Pharmacopœia, which consist in exhausting the drug by percolation with alcohol, concentrating the percolate, and precipitating the resin by the addition of water. The resin so obtained is washed with water and dried by exposure to the air. The "podophyllin" is much lighter in colour than that made from *Podophyllum peltatum;* this was found to be due to the large quantity of the colourless crystalline substance "podophyllotoxin" which it contains (30 per cent.), while the commercial American resin contains on an average about 20 per cent.

The medicinal action of the resin obtained from the Indian plant has been examined by Dr. H. W. G. Mackenzie, of St. Thomas's Hospital, and its effect compared with that of the American resin.

Dr. Mackenzie finds that the two resins are identical in their medicinal effects, and that, therefore, there is no reason why the resin obtained from the Indian root should not be substituted for the American resin.

This is an important result, since the Indian root contains from two to three times as much of the valuable resin as the American root, and is, therefore, the more satisfactory source of the resin.

The following is a tabular statement embodying the results of estimations of the resin in the American plant, and in several specimens of Indian drug collected in various localities :—

(*a.*) *Podophyllum emodi* :—

Name of District in India yielding the Root.	Percentage of Resin found.
Kulu - - - - -	9·55
Bashahr - - - -	9·003
Chamba* - - - -	11·12
„ † - - - -	12·03
Hazara - - - -	9·06

(*b.*) *Podophyllum peltatum.*—Four commercial specimens of roots gave—

(1.) 4·17 per cent.
(2.) 5·2 per cent.
(3.) 5·4 per cent.
(4.) 5·2 per cent.

A complete account will shortly be given of the chemistry of the two plants, and of the nature of the substance to which the resin (podophyllin) owes its medicinal power.

WYNDHAM R. DUNSTAN.

28th November 1896.

APPENDIX K.

Report on some Experiments on Indian Jute.

Second Report.

The Report submitted on the 17th September in Flying Seal letter (No. 55) of that date dealt with the relations between the age of the jute plant and the quality of the fibre yielded by it. The present Report gives the results of experiments made with a view to determine whether the treatment of the raw fibre, soon after its extraction from the plant, with solutions of one or other of certain chemical salts, would be likely to protect the fibre against fermentative and hydrolytic changes to which it is liable during transport in a closely packed condition.

The samples received from the Agriculture and Revenue Department were described as having been collected from one field at about the usual time for

* Young roots. † Old roots.

harvesting, *i.e.*, when the plant is in the pod stage. Quantities of about 40 lbs. of the freshly-stripped wet fibre had been steeped in the solutions, afterwards washed in water, and dried. The average amount of dry jute so obtained was 14 to 15 lbs.

The following are short details of the samples :—

Experiment II., No. 5,226.—40 lbs. of wet jute fibre, simply washed in water and dried for purposes of comparison.

Experiment II., No. 5,227.—40 lbs. of fibre were put in a 2 per cent. solution of sodium carbonate, which was then gradually raised to the boiling point and then allowed to cool, when the fibre was wrung out and dried. The fibre assumed a red colour.

Experiment II., No. 6,693.—40 lbs. of jute unsteeped for comparison with the following :—

Experiment II., No. 6,690.—40 lbs. were steeped for 10 minutes in a cold 2 per cent. solution of sodium sulphite, then removed, washed, and dried.

Experiment II., No. 6,689.—40 lbs. were steeped for 30 minutes in a cold 2 per cent. solution of sodium sulphite, then washed and dried.

Experiment III., No. 5,232.—40 lbs. were placed in 50 lbs. of water containing $3\frac{1}{8}$ lbs. of plantain ash, which was then raised to boiling point; when it had cooled the fibre was removed, washed, and dried.

Experiment III., No. 5,234.—40 lbs. were steeped in solution of tamarind ash (of the same strength as above), and treated in the same way as the previous sample.

Experiment III., No. 5,236.—40 lbs. were steeped in a solution of Babul ash (the strength of solution and the treatment being as in the preceding samples).

The following is a table of chemical results with the remarks of an expert, who has inspected some of the samples :—

——	Moisture.	Ash.	Loss by Hydrolysis (A).	Loss by Hydrolysis (B),	Loss by Mercerising.	Loss by Acid Purification.	Gain by Nitration.	Cellulose.	Remarks.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	
Experiment II.—									
No. 5226. Unsteeped jute.	9·5	1·4	9·7	11·6	—	—	41·7	77·5	A tender sample.
No. 5227. Steeped in sodium carbonate.	10·2	2·5	9·7	14·6	—	—	44·8	77·5	Mixed strength, dark colour.
No. 6693. Unsteeped jute.	11·1	1·0	8·5	8·7	8·8	0·9	45·0	78·2	
No. 6690. Steeped for 10 minutes in sulphite of soda.	11·0	1·7	7·9	12·8	11·0	1·1	40·0	75·4	
No. 6689. Steeped for 30 minutes in sulphite of soda.	9·3	1·8	8·0	11·3	11·8	2·7	43·0	77·1	
Experiment III.—									
No. 5232. Treated with plaintain ash.	9·3	1·6	8·8	11·8	—	—	40·0	79·0	Light brown, rather specky, med. strength.
No. 5234. Treated with tamarind ash.	11·8	1·6	7·0	9·9	—	—	40·0	78·7	Good strength.
No. 5236. Treated with Babul ash.	10·8	·86	·6	2·6	—	—	46·2	78·7	Specky, fair stren.

The samples of jute used in the experiments with sulphite of soda were of high quality, as shown by the results obtained with the untreated sample (No. 6,693). The hydrolysis and mercerising figures are remarkably low and constant; the nitration number is good and the percentage of cellulose is well above the average. Judged solely by chemical results, this is the best sample of jute that has been examined in the Scientific Department. The colour of the fibre was perhaps a trifle dark, but the gloss was good, and its tensile strength (tested roughly by the hand on a few strands) exceptional. It was thought possible that the effect of the sulphite treatment would be to remove the more easily hydrolysable constituents of the fibre, and thereby to reduce the risk of fermentation setting up in the packed fibre. The results

of examination of the treated samples tend to establish the contrary, as judging from the numbers furnished by 6,690 and 6,689, which shows that the whole percentage loss under mild hydrolitic agents is somewhat diminished, as might be expected, the material has been rendered more sensitive to stronger re-agents, and, therefore, that it had certainly not become less prone to change. A certain amount of colour had been developed in the fibre, and it was distinctly more tender. This result was communicated to Mr. Cross, the Member of the Committee of Advice on Fibres, and he replied that some new experiments he and Mr. Bevan had made on cereal straws went far to explain the matter. They find that the proportion of permanent tissue or cellulose in the straws distinctly increases after harvesting, by merely keeping the fibre; that is, a hardening or oxidising action ensues. The treatment with the deoxidising salt appears to have the effect of preventing this oxidising action setting in, and is, therefore, not to be recommended.

The results of examination of the sample treated with sodium carbonate cannot be said to afford any evidence in favour of such treatment. The high percentage of ash in No. 5,227 is easily accounted for by insufficient washing of the sample after removing from the saline solution. The difference between the A and B hydrolysis numbers shows some increase upon the difference in the untreated sample (5,226), but comparison is rendered difficult by the fact that this latter appears to have suffered in some special way, judging from the unfavourable opinion of the experts.

The results of Experiment III. are rendered almost valueless by the fact that there was no special sample of the untreated fibre kept for comparison. The collector of the sample may have intended No. 5,226 to serve this purpose, but the intention is not obvious in his notes, and, as before stated, No. 5,226 has to be regarded with suspicion. Referring to the Report submitted on the 21st February 1895 (F. S. 41) upon a miscellaneous series of jutes contained in Indian collections, it appears that the average difference between the A and B hydrolysis numbers is about 4. This difference is slightly lowered in samples 5,232—5,236 (treated with the alkaline ashes), but no very clear deductions present themselves in the analyses.

In view of the great difficulty of introducing any alteration of the usual method of preparing jute fibre, and of the doubtful evidence afforded by these experiments that any benefit results from the particular method of treatment tried, it cannot be urged that any more extensive trials in the direction indicated in these experiments should be adopted; the logical conclusion is that attempts at special chemical treatment of the fibre to be applied in India before supply to the jute mills, or before shipment, is not to be advocated.

WYNDHAM R. DUNSTAN.

24th April 1896.

APPENDIX L.

Report on some Indian Gums.

The gums which have been examined are described in a letter from Dr. George Watt to Mr. Royle, dated the 2nd June 1896, which enclosed a copy of a Memorandum, No. 286, dated 29th June 1895, from Mr. Gamble. Conservator of Forests, School Circle, North-West Provinces and Oudh, on the subject. Mr. Gamble stated that the local demand for the following gums, which are procurable in the forests of the Saharanpur Division, is not very good, and that it would be advantageous if new and better markets could be found for such products. At present the supply is limited, but if new markets could be found, the supply of certain kinds, especially those of Jingan and Pial, could be greatly increased.

Four samples were received :—

1. Semla (*Bauhinia retusa*) gum.
2. Jingan (*Odina Wodier*) gum.
3. Pial (*Buchanania latifolia*) gum.
4. Salbar (*Boswellia serrata*) gum.

The following is an account of the chemical examination of these samples:—

Bauhinia retusa.—The sample consisted of large rounded tears and irregular masses, together with small angular fragments. The tears were opaque, brittle, breaking with a vitreous fracture, and brown in colour. The fragments were translucent and varied in colour from yellow to brown. The taste was bland and mucilaginous, though the gum was not very soluble in the mouth. The percentage of moisture in the natural gum was 13·5, and of ash in the dried gum 3·18. When the gum was mixed with twice its weight of water it swelled up, absorbing the whole of the water, and forming a stiff gelatinous mass. It absorbed in this way six or eight times it weight of water. A 10 per cent. solution, made for determining its comparative viscosity, yielded a thick mucilage which could not be manipulated. A 5 per cent. solution was therefore employed. Even with this amount of water, a considerable quantity of the gum remained insoluble, swelling up and forming a gelatinous mass. This jelly was removed by straining through muslin, and the viscosity of the mucilage determined (*see below*). The solution gave the usual reactions of gum acacia and only very faintly reduced Fehling's solution. With iodine no colour was given, showing the absence of starch and dextrine. Though resembling gum arabic in some of its properties, this gum is more like tragacanth in its behaviour to water. It possesses considerable gelatinising power.

Odina Wodier.—The specimen consisted of small rounded tears and angular fragments, with a few large irregular masses. The tears were opaque and fissured, the fragments translucent, the gum had very little taste, and varied from white to yellowish white in colour. The gum contained 12·3 per cent. of moisture, and the ash in the dried gum amounted to 3·73 per cent. The gum was completely soluble in twice its weight of water, forming a rather thin mucilage, which possessed considerable adhesive power. The viscosity of the mucilage, compared with good gum arabic, is given in the Appendix. The watery solution answered the ordinary tests for gum arabic, except that it had a marked reducing action on Fehling's solution, indicating the presence of a sugar. A solution made with boiling water and cooled was unaffected by iodine, showing the absence of starch and similar constituents.

Buchanania latifolia.—The gum occurred in large irregular masses, tears, and small fragments. The fragments were clear and glassy, as also were the larger masses. The latter contained considerable quantities of impurity, in the shape of pieces of bark, &c., and the whole sample was contaminated with vegetable débris. The gum had little taste, and the fragments varied in colour from yellow to reddish brown. The amount of moisture present in the gum was 14·2 per cent., and the ash calculated from the dried gum amounted to 6·27 per cent. The gum was not entirely soluble when mixed with twice its weight of water, a portion swelling up, forming a gelatinous mass, which remained undissolved. When making the solution for the viscosity determination, the quantity of this insoluble portion was roughly estimated and found to be about 10 per cent. The mucilage obtained by treating the gum with twice its weight of water was thick, and possessed strong adhesive properties; it behaved like ordinary gum arabic, contained no starch, but a small quantity of sugar was detected.

Comparative Determinations of Viscosity.

The viscosity of the solutions yielded by these gums compared with that of a solution of the best gum arabic was approximately determined by noting the time taken by 50 c.c. of a 10 per cent. solution to run from a burette fitted with a fine jet. In the case of the gum from *Bauhinia retusa* a 5 per cent. solution was employed. The following table gives the results obtained:—

	Strength.	Burette Time in Seconds.
Gum arabic	10 per cent.	78
Odina Wodier	10 „	58
Buchanania latifolia	10 „	184
Bauhinia retusa	5 „	200

It appears from these approximate results that a solution of the gum from *Odina Wodier* possesses about three-fourths of the viscosity of a similar solution of gum arabic, that of the gum from *Bachanania latifolia* is more than twice, and that from *Bauhinia retusa* nearly eight times as viscous as gum arabic solution of the same strength.

The only previously recorded examination of these gums seems to be that by Dr. Rideal in 1892 (Journal of the Society of Chemical Industry, Volume II.), who was furnished with small samples by Professor Pedler of Calcutta. Although it is evident from the preliminary results recorded by Dr. Rideal that the gums examined by him were the same in origin as those now under notice, it is obvious that their quality is different and usually inferior. It is important that attention should be paid in the future to the exportation of gum of uniform quality.

Boswellia serrata.—This is a gum of an entirely different class. It closely resembles frankincense in its chemical properties. There is little demand for such a product in this country, but it might find a market on the Continent as an ingredient for incense.

Since the commercial value of the gums of the Acacia type must depend on other circumstances than those connected with their chemical properties, as, for example, colour, size, freedom from contamination with extraneous substances, &c., it was thought desirable to obtain the opinions of several of the best known London dealers in gums. They were each supplied with small representative samples of the three gums, and were asked to furnish a report on their probable commercial value. The four reports which have been received may be summarised as follows:—

1. These brokers report that *Odina Wodier*, chiefly on account of its solubility, would be the most readily saleable. The less soluble varieties, *Bauhinia retusa* and *Buchanania latifolia*, they consider of small value, as large quantities of similar gums are received in this country from Persia. They are chiefly bought by Continental dealers, and are said to be treated by some special process and rendered soluble. Prices for these inferior gums are not large—from 10*s.* to 20*s.* per hundredweight.

2. The brokers report that there is on the English market a large quantity of all kinds of East Indian gums, which renders it very difficult to dispose of inferior qualities. The only sample which they consider would command a free market is that of *Odina Wodier*. With reference to *Bauhinia retusa*, it is remarked that this gum closely resembles Persian or Bassorah gum, but it is not considered to possess at the present time any commercial value. *Odina Wodier* is compared with Cape gum, and, like it, might be used for preparing pale-coloured mucilages, and for mixing with gum acacia to reduce the cost of the latter. Its value is stated to be between 25*s.* and 30*s.* per cwt. *Buchanania latifolia* is described as a gum of inferior quality, only partially soluble, containing a large quantity of extraneous matter. It might be useful for cheap manufacturing purposes where the dark colour would not be detrimental. It is likely to fetch 20*s.* per cwt. These brokers remark that it is desirable, when introducing a new gum, to ship it in large quantities of not less than, say, 5 tons, as English consumers will not trouble to substitute new gums unless they are certain of obtaining a constant supply of average quality.

3. The brokers report that all the samples are of inferior quality. *Bauhinia retusa* is probably worth 15*s.* to 20*s.* per cwt. *Odina Wodier*, which they remark has been carelessly collected and is largely mixed with earthy matter and wood, would fetch from 20*s.* to 25*s.* per cwt. *Buchanania latifolia* they report to be of little value.

4. *Buchanania latifolia* is stated to be too insoluble to be of much value. *Bauhinia retusa* is an inferior gum worth about 10*s.* per cwt. *Odina Wodier* is the most valuable of the three samples submitted, but its appearance is much against it. If a constant supply could be obtained, and if more care be taken in collecting it, it could probably be sold at from 30*s.* to 35*s.* per cwt.

It will be seen from these commercial reports, that it would be worth while to pay some attention to the exportation of *Odina Wodier*, but it will evidently be necessary to take greater care in the collection of the gum, and to avoid the inclusion of extraneous matter. It would probably be desirable to pick out the better pieces which are nearly free from colour, and send them as a separate consignment of first quality, the coloured and contaminated fragments being included in a separate consignment of second quality. It also appears

that *Buchanania latifolia* might be worth exporting if greater care were taken in its collection, and especially if large quantities of slightly coloured fragments could be put on the market. One firm of brokers who reported on the samples, offered to take charge and dispose of any consignments of these gums which may be sent to this country.

WYNDHAM R. DUNSTAN.

2nd February 1897.

APPENDIX M.

Report on a sample of Tobacco received from Messrs. Begg, Dunlop and Co., of Calcutta, marked "Tobacco leaves containing less than 7½ per cent. of moisture."

This consignment of tobacco is described in a letter, dated the 4th August 1896, from Dr. George Watt, to Mr. Royle. It is stated to be "Bright Leaf Tobacco," prepared at the Pioneer Factory in the District of Tirhoot.

The sample consisted of packets each containing about six or seven fine tobacco leaves; they were pale brown in colour, with a slight aromatic odour and a distinctly sweet taste. The amounts of the following constituents were determined:—

1. *Moisture.*—The amount of moisture, determined by drying for six hours at 100° C., was ascertained to be 9 per cent. This is about the usual quantity of water contained in prepared tobacco leaves; the average percentage in fine Virginian leaf tobacco has been recorded as 8·9 per cent.

2. *Ash.*—The amount of ash (mineral constituents) determined on the dry tobacco is 18·67 per cent., of which 84·54 per cent. consists of salts and other mineral constituents soluble in hydrochloric acid, whilst 15·46 per cent., or 2·8 per cent. calculated on the dried leaf, is silica—that is, sand. It may be added that the ash contained scarcely a trace of sodium salts. These numbers compare very favourably with those obtained in the analysis of various specimens of tobacco. The ash usually ranges between 8 and 20 per cent., the latter number being the average for ordinary samples. Percentages varying from 11 to 18 have been recorded for Virginian leaves.

3. *Sugar.*—The amount of sugar contained in the air-dried leaf is 5·28 per cent., all of which is present in the form of glucose or grape-sugar; no cane-sugar or other similar carbo-hydrates could be detected.

4. *Nicotine.*—The percentage of nicotine in the dry leaf has been very carefully determined and found to be 2·19 per cent., which corresponds with the quantity found in some of the milder varieties of tobacco, notably in those from Havannah and Maryland. This percentage is much lower than that found in many of the stronger and coarser varieties, in which the proportion of nicotine is often as high as from 7 to 8 per cent.

These results show that this sample of Indian tobacco is of excellent quality. It is, however, not possible to arrive at a conclusion as to the commercial value of a specimen of tobacco from the results of chemical analysis alone. It will be necessary to obtain reports from technical experts and dealers in tobacco in this country. Mr. Royle, the Curator of the Indian Section, has already taken steps to obtain such reports. It might, perhaps, be useful if the experts consulted were put in possession of the analytical numbers recorded above. I understand that the remainder of the consignment is to be put up to auction. If this is done, I think it would promote the satisfactory sale of the consignment, if a statement of the analytical percentages were included in the description of the sample.

I entirely agree with the suggestion made by Dr. Watt in his letter on this subject as to the desirability of our undertaking to prepare a series of comparative reports on Indian tobacco grown in different districts, and I shall be glad to make arrangements for the chemical part of the inquiry to be conducted in the laboratories of the Scientific Department.

WYNDHAM R. DUNSTAN.

28th January 1897.

Appendix N.

Report on the Analyses of Indian Iron Ores.

A series of specimens was received some time ago from the Revenue and Agriculture Department of the Government of India, which represent the iron ores yielded by mines in the Madras Presidency, and chiefly from the mountain ranges in the vicinity of Salem.

The metal in these ores is, in all cases, in the form of oxides; the samples include varieties of magnetite, quartz-magnetite schist, and magnetic sand. They vary very considerably in richness; thus, No. 793, from the northern flank of the Kollimalais, contains 70 per cent. of available iron, whilst a quartz-magnetite schist from the same locality contains only 30 per cent. of iron, and more than 50 per cent. of silica and gangue, insoluble in acids. The whole of the samples contain magnetic oxide, in various proportions, and in no case was any titanium found.

Phosphoric acid and sulphur are not present in any one instance in considerable proportions, and, generally, they are present as traces only.

Manganese is not present in more than minute quantities in any of the samples.

The method of examination pursued was as follows:—

A representative sample of the ore, reduced to very fine powder, was digested with *aqua regia*, and the insoluble residue, after ignition, weighed as silica and gangue.

In the filtrate were determined the remaining constituents.

The total iron was estimated by reduction and titration against standard bichromate in the usual manner, and, by means of a separate estimation of the ferrous oxide in a fresh sample of the ore, digested with hydrochloric acid in a neutral atmosphere, the amount of iron in the ferric state was arrived at.

The phosphoric acid and sulphur were determined in the ordinary way by precipitation with ammonium molybdate and "magnesia mixture," and with barium chloride, respectively.

The proportions of alumina present were arrived at by difference, the combined weights of ferric oxide and phosphoric acid being subtracted from the total precipitate obtained with ammonia.

The following is a description of the several samples of ore examined, with the analytical results furnished by each:—

Ore from Murugathee Malai, Attur Taluq, Salem District (No. 821).

Decomposed magnetite quartz schist, in fragments, as mined by the native iron smelters.

The ore was laminated, and of a mottled appearance, showing portions which were respectively of a slate-brown, red, and purple colour; it was strongly magnetic, very friable, being readily reduced to powder between the fingers, and, when finely ground, was of a light brown colour.

Hygroscopic moisture (at 110° C.)	0·28
Combined water	1·72
Silica and gangue	36·44
Ferrous oxide	6·78
Ferric oxide	53·75
Alumina	0·28
Lime	Traces.
Phosphoric acid	Traces.
Silica	0·68

From Kanjamalai, Salem District, Madras (813).

This ore was in small, slightly magnetic, glistening black flakes, with red-brown granules scattered through them.

Hygroscopic moisture (110° C.)	0·19
Combined water	0·91
Silica and gangue	48·45
Ferrous oxide	11·62

Ferric oxide	38.13
Phosphoric acid	0·62
Sulphur	·029
Alumina	0·46

Magnetite from Kanjamalai, Salem District, Madras (815).

This sample was in small fragments, strongly magnetic, of a lustrous black crystalline appearance, coated in places with a red-brown non-crystalline substance.

Hygroscopic moisture (110° C.)	Nil.
Combined water	0·72
Silica and gangue	1·72
Ferrous oxide	30·03
Ferric oxide	66·72
Alumina	0·82
Phosphoric acid	Traces.
Sulphur	·020

Magnetic iron ore-sand (852), obtained by washing crushed quartz magnetite schist, near Wandur, Ernad Taluq, Malabar District.

The sample was in the form of a coarse sand, which could be separated into three distinct groups; a dark-brown ore, slightly magnetic; a black crystalline ore, strongly magnetic, and silica. An average sample furnished the following results:—

Hygroscopic moisture	1·42
Silica and gangue	12·43
Ferrous oxide	14·26
Ferrix oxide	70·34
Alumina	0·84
Phosphoric acid	0·14
Sulphur	·024
Lime	0·28

Quartz magnetite schist (795), from the Salem District, mined by the Native iron smelters on the northern flanks of the Kollimalai.

This was a dark-grey friable and magnetic ore, with red-brown veins interspersed, and a large amount of siliceous matter.

Hygroscopic moisture	1·35
Silica and gangue	53·22
Ferrous oxide	4·14
Ferric oxide	41·00
Phosphoric acid	0·30
Sulphur	·030
Alumina	0·12
Lime	0·30

Quartz magnetite schist (796), from the northern flanks of the Kollimalais, three miles south of Namagiripett, Salem District.

Consists of layers of quartz containing crystalline, greyish-black, strongly magnetic masses, interspersed with a non-crystalline and non-magnetic mineral, varying in colour from red-brown to red. This sample was very friable.

Hygroscopic moisture	0·67
Silica and gangue	53·98
Ferrous oxide	4·96
Ferric oxide	40·44
Phosphoric acid	Traces.
Alumina	Traces.
Sulphur	·022

Magnetic sand (809), from Mathurutu, four miles west of Mallikari Attur Taluq, Salem District.

The sample, which was described as "prepared for the furnace," consisted of a pulverised mixture of highly magnetic black particles, with a large amount of siliceous matter, and a small proportion of reddish-brown grains.

Hygroscopic moisture	0·69
Silicia and gangue	6·51
Ferrous oxide	14·09
Ferric oxide	77·51
Alumina	1·15
Sulphur	·010
Phosphoric acid	—

Quartz magnetite schist (850), mined for the deposit by Moplahs near Wandur, Ernad Taluq.

This sample was in yellowish-brown fragments, with small patches of a darker brown crystalline substance, and much siliceous matter. It was of a sandy friable nature, and the darker portions were magnetic.

Hygroscopic moisture	3·60
Silica and gangue	34·96
Ferrous oxide	13·91
Ferric oxide	46·40
Phosphoric acid	Traces.
Alumina	0·93
Lime	Traces.
Sulphur	·012

Quartz magnetite schist (810), from Kollimalais, Salem District.

The sample was described as obtained by crushing and sifting the decomposed magnetite schist. It was a red-brown coarse powder containing particles, with glistening facets, which were strongly magnetic.

Hygroscopic moisture	0·70
Silicia and insoluble	3·43
Ferrous oxide	17·36
Ferric oxide	77·95
Sulphur	·026
Alumina	0·98
Phosphoric acid	—

Magnetite from Kanjamalai, Salem District (873).

This blackish-brown sample was roughly crushed; the greater portion was strongly magnetic, and this, when separated from the rest by means of a magnet, was a black crystalline mineral. The remainder was of light brown colour and contained siliceous matter.

Hygroscopic moisture	0·95
Silica and gangue	8·89
Ferrous oxide	17·72
Ferric oxide	70·98
Alumina	1·18
Phosphoric acid	Trace.
Sulphur	·029

Crushed and sifted ore (800), from Namagiripett, Salem District.

It was a reddish-brown, strongly magnetic powder.

Hygroscopic moisture	0·73
Ignited insoluble residue	1·74
Ferrous oxide	17·68
Ferric oxide	78·07
Alumina	1·49
Sulphur	·089
Phosphoric acid	—

Crushed quartz magnetite schist (851), from near Wandur, Ernad Taluq, Malabar District.

A roughly powdered yellowish-brown ore, magnetic, and containing a considerable quantity of siliceous matter.

Hygroscopic moisture	2·16
Ignited insoluble residue	32·46
Ferrous oxide	6·35
Ferric oxide	57·37
Alumina	0·90
Phosphoric acid	—
Lime	0·41
Sulphur	·020

Crushed and sifted ore (808), from Mathurutu, Attur Taluq, Salem District.

This was greyish-black, crystalline, and strongly magnetic; a small quantity of a yellowish brown ore, and a considerable amount of siliceous matter was distributed through it.

Hygroscopic moisture	0·72
Ignited insoluble residue	14·26
Ferric oxide	68·12
Ferrous oxide	16·10
Alumina	0·21
Phosphoric acid	—
Sulphur	·019
Manganese and lime	Traces.

Magnetite (799), from Kanjamalai, Salem District.

A blackish-grey, lustrous, strongly magnetic mineral, containing small patches of a white substance, which were aluminium and calcium-phosphate.

Hygroscopic moisture	0·59
Ignited insoluble residue	1·04
Ferrous oxide	20·97
Ferric oxide	75·20
Alumina	2·45
Phosphoric acid	0·30
Sulphur	·016
Manganese and lime	Traces.

Magnetite sand (801), from Mathurutu, Attur Taluq, Salem District.

The sample was in the form of a fine black powder, having been prepared for furnace-treatment; it contained a small quantity of yellowish-brown siliceous particles, and was strongly magnetic.

Hygroscopic moisture	0·72
Ignited insoluble residue	9·56
Ferrous oxide	11·67
Ferric oxide	77·64
Alumina	0·24
Phosphoric acid	Traces.
Sulphur	·025

Ore, as mined by the native smelters (802), from the Northern flanks of the Kollimalais, Salem District.

Hygroscopic moisture	1·10
Ignited insoluble residue	45·19
Ferrous oxide	2·07
Ferric oxide	51·10
Alumina	0·86
Phosphoric acid	—
Sulphur	·013

From Kanjamalai (874), Salem District.

A roughly powdered sample, consisting of a blackish-brown, magnetic mineral, mixed with a red-brown variety.

Hygroscopic moisture	1·72
Ignited insoluble residue	3·17
Ferrous oxide	23·73
Ferric oxide	69·29
Alumina	2·16
Phosphoric acid	—
Lime	—
Sulphur	0·09

From the northern flank of Kollimalais (793), three miles south of Namagiripett, Salem District.

A purplish-grey, strongly magnetic massive ore, with a small amount of a red-brown powder scattered through it. It was generally of a flaky crystalline appearance when freshly broken.

Hygroscopic moisture	0 52
Ignited insoluble residue	0·55
Ferrous oxide	22·38
Ferric oxide	74·77
Alumina	1·00
Phosphoric acid	Traces.
Lime and manganese	Traces.
Sulphur	·030

Similar ore to No 802, from Kanjamalai, Salem District (812).

It was crystalline, grey-black, slightly magnetic, and contained a small amount of a brown non-crystalline powder.

Hygroscopic moisture	1·02
Ignited insoluble residue	46·95
Ferrous oxide	3·56
Ferric oxide	48·10
Alumina	0·61
Sulphur	·010
Phosphoric acid	—

From Walluvanad Taluq, Malabar District (848).

This was a granular and very friable ore, partly of a purplish-grey colour, and partly dark-red and amorphous. It was slightly magnetic.

Hygroscopic moisture	0·60
Ignited insoluble residue	45·94
Ferrous oxide	6 67
Ferric oxide	46·03
Alumina	0·42
Sulphur	·010
Lime	—

The following is a tabulated summary of the percentage composition of the several samples. A column has been added, giving the total amount (per cent.) of iron in each sample:—

Serial Number.	Description.	Locality.	Available Iron.	Water.	Ignited Insoluble Residue.	Ferrous Oxide.	Ferric Oxide.	Phosphoric Acid.	Alumina.	Lime.	Sulphur.*
799	Magnetite - -	Kanjamalai, Salem District - - -	68·95	0·59	1·04	20·97	75·20	0·30	2·45	—	·016
812	Ditto - -	Ditto ditto - - - -	36·44	1·02	46·95	3·56	48·10	—	0·61	—	·010
813	Ditto - -	Ditto ditto - - - -	35·73	1·10	48·45	11·62	38·13	0·62	0·46	—	·029
815	Ditto - -	Ditto ditto - - - -	70·06	0·72	1·72	30·03	66·72	—	0·82	—	·020
873	Ditto - -	Ditto ditto - - - -	63·57	0·95	8·89	17·72	70·98	—	1·18	—	·029
874	Ditto - -	Ditto ditto - - - -	66·96	1·72	3·17	23·73	69·29	—	2·16	—	·009
793	Ditto - -	Northern flanks of Kollimalais, 3 miles S. of Namagiripett, Salem.	69·75	0·52	0·55	22·38	74·77	—	1·00	—	·030
802	Ditto - - -	Northern flanks of Kollimalais, Salem District - -	37·38	1·10	45·19	2·07	51·10	—	0·86	—	·013
848	Ditto - -	Walluvanad Taluq, Malabar District - - -	37·63	0·60	45·94	6·67	46·03	—	0·42	—	·010
800	Magnetite "sifted" -	Namagiripett, Salem District - - -	68·40	0·73	1·74	17·68	78·07	—	1·49	—	·089
808	Ditto ditto -	Mathurutu, Attur Taluq, Salem District - -	60·21	0·72	14·26	16·10	68·12	—	0·21	—	·019
810	Ditto ditto -	Kollimalais, Salem District - - - -	68·06	0·70	3·43	17·36	77·95	—	0·98	—	·026
795	Quartz-Magnetite Schist -	Northern flanks of Kollimalais, Salem District -	31·92	1·35	53·22	4·14	41·00	0·30	0·12	0·30	·030
796	Ditto ditto -	Northern flanks of Kollimalais, 3 miles S. of Namagiripett, Salem District.	32·17	0·67	53·98	4·96	40·44	—	—	—	·022
821	Ditto ditto -	Murugathii Malai, W.S.W. of Attur, Salem District -	42·93	2·00	36·44	6·78	53·75	—	0·28	—	·068
850	Ditto ditto -	Wandur, Ernad Taluq, Malabar District - - -	43·30	3·60	34·96	13·91	46·40	—	0·93	—	·012
851	Ditto ditto -	Ditto ditto - - -	45·10	2·16	32·46	6·35	57·37	—	0·90	0·41	·020
852	Magnetic Sand - -	Ditto ditto - - -	60·33	1·42	12·43	14·26	70·34	0·14	0·84	0·28	·024
801	Ditto ditto - -	Mathurutu, Attur Taluq, Salem District - - -	63·43	0·72	9·56	11·67	77·64	—	0·24	—	·025
809	Ditto ditto - -	Mathurutu, 4 miles W. of Mallikari, Attur Taluq, Salem District.	65·22	0·69	6·51	14·09	77·51	—	1·15	—	·010

* In the results as first reported the numbers for Sulphur were printed 0· instead of ·0.

13th May 1896.

F. A. ABEL.

APPENDIX O.

Report by Professor A. H. Church, M.A., F.R.S., on the Composition of some Indian Food-seeds.

Euryale Ferox, Salisb.

Synonyms.—Anneslea spinosa, Roxb. ; Euryale indica, Planch.
Vernacular : Makhana, Hind. and Beng.

This wild aquatic plant affords an easily digestible and nutritious food, in which the ratio of albuminoids to starch is approximately 1 to 6. The figures of the annexed analysis are interesting, as we possess very scanty information concerning the constituents of the seeds of plants belonging to the *Nymphæaceæ*. Makhana seeds are eaten and relished by the natives of Eastern Bengal and Manipur. They are cooked by roasting them in hot sand, when the exceedingly hard seed-coat bursts—becoming easily removable.

The seeds of this water-lily, after removal of the seed-coat, gave these percentages on analysis :—

Water	12·3
*Albuminoids	12·8
Starch (by diff.)	73·3
Oil	0·9
Fibre	0·3
Ash	0·4

Perilla Ocimoides, L.

Synonyms.—Perilla macrostachya, Benth. ; Ocimum frutescens, L. ; Melissa maxima, Ard. ; Mentha perilloides, Willd.
Vernacular: Bhanjira, Hind. ; *Kenia,* Naga.

The seeds of this aromatic herb (which belongs to the N. O. *Labiatæ*) enter into the dietary of the hill-tribes of the North-West Himalayas and in Manipur. Perilla affords a rare example of the use of labiate seeds for food. The nutrient-ratio is here about 1 to 5.

These labiate seeds, analysed as received, gave the following percentages :—

Water	5·3
†Albuminoids	22·6
Soluble carbohydrates (by diff.)	10·6
Oil	43·2
Fibre	14·0
Ash	4·3

In view of the importance of promoting the utilisation, in India, of seeds and grains available as food, it is very desirable that instructions should be issued officially for ensuring their proper preparation (cleaning, decorticating, cooking, &c.) for consumption, especially as regards the less known and less valuable varieties, as their digestive character and wholesomeness, and general value as food in times of scarcity, depend upon the wide diffusion of proper instructions for their use.

11th November 1896.

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* Calculated from 2·04 per cent. total nitrogen (*obtained by Kjeldahl's method*). The albuminoids coagulated by phenol in the presence cf metaphosphoric acid amounted to 10·8 per cent.

† Calculated from 3·61 per cent. total nitrogen (*obtained by Kjeldahl's method*). The albuminoids coagulated by phenol in the presence of metaphosphoric acid amounted to 19·8 per cent.

Appendix P.

Report by Professor W. C. Unwin, F.R.S., on Mechanical Tests of an Indian Timber.

The plank dealt with, which was about 2¾ inches thick and rather exceptionally dry (as the wetness test shows), is described as the timber of *Lagerstræmia Flos-Reginæ*, or *Pyinma*. The colour of this wood is brown or light walnut.

A block, weighing 599·3 grams., was tested for density. The specific gravity was 0·669 and the heaviness 41·77 lb. per cubic foot.

Some shavings dried in an oven at about 180° F for 11 hours showed the amount of moisture in the timber to be 13·77 per cent., reckoned on the weight of the dry wood.

Shearing Test.—Two tests were made: (*a*) with the shearing plane about parallel to the annual rings, (*b*) with the shearing plane about at right angles to the annual rings.

(*a*) Block 69c.

Dimensions, 1·935 × 2·036 inches.
Area sheared, 3·939 sq. inches.
Shearing load, 3,588 lbs.
Shearing stress, 910·8 lbs. per sq. inch = 0·407 tons per sq. inch.

(*b*) Block 69d.

Dimensions, 1·985 × 1·980 inches.
Area sheared, 3·930 sq. inches.
Shearing load, 2,349 lbs.
Shearing stress, 597·7 lbs. per sq. inch = 0·267 tons per sq. inch.
Mean shearing resistance, 754 lbs., or 0·337 tons per sq. inch.

Transverse Test.—Two tests were made with rectangular bars on a span of 45 inches—

Bar 69a.—Width, 3·503 inches. Depth, 2·592 „

Bar 69b.—Width, 3·629 inches. Depth, 2·607 „

Load at Centre, in Pounds.	Deflections, in Inches.		Load at Centre, in Pounds.	Deflections, in Inches.	
	69a.	69b.		69a.	69b.
0	—	—	2,000	0·569	0·677
250	0·085	0·106	2,250	—	0·736
500	0·170	0·212	2,500	0·927	0·787
750	—	0·286	3,000	—	1·036
1,000	0·362	0·368	3,500	—	1·256
1,250	—	0·451	3,960	Broke.	—
1,500	0·520	0·526	4,000	—	1·466
1,750	—	0·572	4,398	—	Broke.

Both bars broke by tension.

The following are the results reduced:—

Bar.	Co-efficient of Transverse Strength.		Range of Stress, in Pounds.	Co-efficient of Elasticity.	
	Pounds.	Tons.		Lb. per sq. in.	Tons per sq. in.
69a	11,355	5·07	0 to 2,000	1,312,500	585·8
69b	12,037	5·37	0 to 2,500	1,125,400	502·4
Mean	11,696	5·22	—	1,218,950	544·1

Compression Test.—Two tests were made :—

Block 69e.—Dimensions, 2·452 × 2·499 inches.
Height, 6·55 inches.
Area crushed, 6·128 sq. inches.
Crushing load, 16·91 tons.
Crushing stress, 2·759 tons per sq. inch.

Block 69f.—Dimensions, 2·418 × 2·490 inches.
Height, 6·50 inches.
Area crushed, 6·020 sq. inches.
Crushing load, 16·68 tons.
Crushing stress, 2·765 tons per sq. inch.

Both specimens broke fairly by shearing. The mean crushing resistance is 2·762 tons per sq. inch.

Considering that the wood is not very heavy, its strength is good.

11th November 1896.

Appendix Q.

SELECTIONS from CORRESPONDENCE ["FLYING SEAL" and "DIRECT"] 1896–97, between the IMPERIAL INSTITUTE and DEPARTMENTAL OFFICERS in INDIA.

From George Watt, Esq., M.B., C.M., C.I.E., Reporter on Economic Products to the Government of India, to Sir Frederick Abel, Bart., K.C.B., Secretary and Director, Imperial Institute.

Jute.

(Report No. 38.—Jute.) Indian Museum, Calcutta,
Sir, 11th March 1896.

In continuation of previous correspondence on the subject of jute, and with special reference to your letters, Flying Seal Series No. 41, dated 21st February; No. 55, dated 17th September; and No. 64, dated 5th December 1895, I would desire you to note that this Office letter, Flying Seal Series, No. 27, dated the 5th November, was (though by oversight not definitely stated to be so) intended as a reply to the two earlier of the above-mentioned communications. Your letter, No. 41, proposed certain experiments to test the age at which the plant yielded the best fibre. My reply stated what had been done, and advised despatch of the sample in illustration of the experiments. Your letter, No. 55, recommended certain experiments to test the effect of preventing or retarding the flowering of the plant. My reply stated that these experiments could not be tried this year, and, moreover, showed the impracticable nature of these recommendations. It also contended that, owing to climatic and other considerations, there was very little hope of any material improvement being effected in either the methods of cultivation or process of separation of the fibre.

My letter also advised the despatch of samples of jute treated with sulphite of soda.

2. Your letter, No. 64, acknowledges receipt of the samples recapitulated above, and asks to be informed whether my remarks as to "any change in the "system of jute cultivation apply equally to any change which might suggest "itself in the system of separating the fibre from the plant when collected." I would point out that my previous letter stated that that was so, but it may perhaps be desirable to explain my views of the case more fully. Jute is pre-eminently a crop of tropical swamps, luxuriating as it does when half submerged in three to six or eight feet of water. It is grown during the rainy season, when the atmosphere is such that nothing can be kept more than a few hours without undergoing rapid putrefaction. The stems could not, therefore, be preserved for the time necessary to be carried from the fields to a factory or machine. The people of such regions, and particularly at that season of the year, are not characterised by possessing a superabundance of

energy or enterprise. The fibre is sold for so very little that it could not afford to be burdened with any extra charges over that of the cultivator's labour in retting the stems and beating the fibre in pools of the water that are everywhere at hand. If extra charges have to be imposed, they must be borne by the buyers—the merchants or mill-owners. The fibre is required for a specific purpose, which it fulfils admirably. No one wants it improved. To make the fibre stronger and more durable would practically ruin much of the present demand. If a better fibre be required for a market a little higher than that of jute, why not adopt sida or many other better fibres than jute, that could be extensively grown where jute cultivation is impossible.

These and such like considerations are the grounds on which I base my opinion that in neither the methods of cultivation nor process of separation of the fibre is there much room for improvement.

3. The chief improvement the jute mills would welcome would be a larger supply of a more uniform quality of fibre. And there are, among others, at least two directions on which the latter consideration might be realized. First improvement of stock by selection. There are, for example, two species of *Corchorus*, the fibres of which are known as jute, and within each of these species numerous races. If the chemist were to show that the want of uniformity proceeds from the various forms of the plant yielding fibres of widely different properties, which from want of selection of stock become mixed of necessity, then influence might be brought to bear on the subject of the seed used by the cultivators. In the second place, if the chemist shows that there is a definite age in the plant at which the fibre is ripe and beyond which it degenerates, influence might be brought to bear on the cultivators to reap their crop at the approved period. But there would be great difficulty, no doubt, in securing punctual reaping, as the crop has often to wait the convenience of the limited labour supply at the cultivator's disposal. But the principle I have advocated, that improvements that could be effected without materially increasing the cost of production or the labour of the cultivators would be a measure of practical importance, but beyond that they are not likely, for the next century at least, to become of value to the people of this country, however interesting they might be.

4. I take this opportunity of saying in conclusion that "The Agricultural Ledger," incorporating the information you have been good enough to furnish, has not, as yet, been published, so that were Mr. Cross to supply me at an early date with the second part of his report, that would enable me to publish results of his investigations in one paper.

I have, &c.,
GEORGE WATT.

From Dr. George Watt to J. Herbert, Esq.

Myrobalans.

Calcutta,
25th April 1896.

Sir,

I have the honour to reply to your letter, No. 2649—41/28, dated 22nd March, and in continuation of my letter, No. 1152, dated 24th April 1896, on the subject of Myrobalans. The suggestion offered by you regarding the preparation of a note on that tanning material will receive early consideration. It was, in fact, with that object in view that my letter, No. 492/61, with its enclosure, Circular No. 46, was forwarded to you. Briefly stated, the position of affairs may be said to be that two consignments of equal value (judged by external appearances) are found by the tanner to differ from each by nearly 50 per cent. of tannin. The question has arisen are such discrepancies in the chemical values of consignments sent into the markets of the world due to—

(*a.*) There being different races or varieties of *Terminalia Chebula* that might be said to yield nuts as dissimilar from each other as the most inferior baking apple differs from the finest dessert apple.

(*b.*) Or to the season of collection, the one being the unripe sour fruit rich in tannin, the other the ripe, sweeter fruit with little or no tannin.

(*c.*) Or to the nature of the soil and climate under which the trees are grown, the one condition producing a Myrobalan rich in tannin, the other poor.

(*d*) Or to the methods of treatment pursued before sending to market.

2. I might, in fact, mention many possible explanations, not one of which has as yet been solved. Obviously if the Burma nut [due to (*a*) or (*c*)] contains very much less tannin than that of the Central Provinces, it would be unwise to attempt to encourage the trade in your province. Such doubtful points would at once be solved if samples were furnished in accordance with the spirit of the instructions laid down in my Circular No. 46.

3. I may take this opportunity of adding that in some of the replies received to my Circular the very obvious objection has been urged, viz., neither Myrobalans, Babul, nor Cassia (the three articles dealt with in the Circular) are of sufficient abundance in this district to warrant the supposition of a possible future trade. It is, therefore, not considered necessary to furnish samples. I have called this an obvious argument against myself, but, unfortunately, I have had to reply that samples collected from the most unlikely areas may help to throw greater light on the difficulties that beset the trade in these products than samples from the very heart of the chief area of distribution of the trees in question. Accordingly I have had to ask my correspondents to do me the favour to furnish samples with the object of aiding the general inquiry, and without any prospective advantage to the district in question. It is in this light, therefore, that I again invite you to give the subject your favourable consideration, and to furnish such samples and information as you can do conveniently.

I have, &c.,
GEORGE WATT.

From Dr. George Watt to J. R. Royle, Esq., C.I.E.

Sansevieria zeylanica.

Indian Museum, Calcutta,
My dear Royle, 29th April 1896.

I am in receipt of your letter No. 5/96, dated 31st January last, regarding the fibre of *Sansevieria zeylanica*, along with copies of reports from fibre experts. Acting on your suggestion, I have addressed Messrs. Begg, Dunlop, & Co. of this city on the subject of furnishing a few tons of the fibre as an experimental consignment. I have no doubt the matter will have careful attention. On receipt of the fibre it will be forwarded to the Imperial Institute in due course.

2. I take the liberty to give you a passage from a further communication on this subject, from which you will see that some delay may be expected before a large supply of the fibre can be produced. Meantime I shall be greatly obliged if you can procure for me specifications, drawings, and price lists of all machines either used for or suitable for this fibre. I am constantly asked to supply particulars of good fibre-cleaning machines, and you would render a special service to India were you to collect and furnish me from time to time with all available information as to new machinery used in the separation and cleaning of fibres.

I have, &c.,
GEORGE WATT.

From Dr. George Watt to Sir Frederick Abel, Bart.

Indian Coal.

(Report No. 41.—Indian Coal.) Indian Museum, Calcutta,
Sir, June 1896.

With reference to the 2nd paragraph of your letter, No. 299/57 (Flying Seal Series, No. 42), dated the 7th March, 1895, I now have the honour to advise the despatch of a further series of specimens of Indian coal. The cases containing these are numbered 113 to 129 and 131 to 142, and the invoices

were enclosed with this office letters No. 869—XVI./A., dated 25th March, and No. 1005—XVI./A., dated 10th April 1896, respectively.

2. It is hoped that the larger quantities now sent for examination will prove sufficient to allow of practical experiments being made to determine the calorific values, &c., but I am desired to add that it would also be instructive to have chemical analyses as well. Some of the coals now supplied were not furnished at the time the analyses were made which were reported by your letter No. 299—57 (Flying Seal Series, No. 42), dated 7th March 1895, and published in the Agricultural Ledger No. 2 of 1895. Certain of the present contributors have expressed a wish to be furnished with chemical analyses as well as practical tests.

3. I beg further to append, for your information, 10 copies of a tabular statement which will be found to give briefly an abstract of the information furnished to this office, along with the coals received up to date.

4. Other specimens have been promised, and are still being awaited. These will be forwarded in due course as received.

5. I shall be pleased to learn that the consignments herein advised have reached London safely and in good order, and that their examination will shortly be taken in hand.

I have, &c.,
GEORGE WATT.

From Dr. George Watt to J. R. Royle, Esq.

Indian Museum, Calcutta,
21st July 1896.

Sir.

I have the honour to inform you that, in accordance with the Government of India's instructions, I am to open up direct correspondence with you on all matters connected with the organisation, maintenance, and general management of the Indian Collections. I think it accordingly advisable that our correspondence should now assume the ordinary official form (so as to allow of the letters being printed), instead of the demi-official communications that have passed between us heretofore.

2. Letters that pass between Sir Frederick Abel and this office and *vice versâ* will be recorded as Flying Seal, and pass through your office in both directions. I would explain, however, that in connexion with a good many subjects at present under investigation, doubt exists in my mind whether they should be regarded as instituted in connexion with the Scientific Department; when in doubt, I shall address all letters to you, and you will do me the favour to correct any mistakes I may make by treating letters as Flying Seal that you regard as belonging to that category. By your advising me of your having done so, future correspondence on such subjects will be denoted as Flying Seal. I do not propose to assign any separate system of numbering either to the letters addressed by me to you or to Sir Frederick Abel. The numbers will be those current in my office at the time of issue with, in the case of those for Sir Frederick Abel, the letters "Flying Seal" added and the covers left open.

3. I propose to address all consignments of goods in future to you instead of to the Secretary and Director, Imperial Institute. The letters of advice will apprise you as to whether the major portion of the contents are meant for your Department or for the Scientific Department. But I would explain that I do not propose (and have not in the past) made two sets of collections of the same products. All those asked for by the Scientific Department have been registered by this office and duplicates retained here in precisely the same manner as if indented for by you or by an Indian or by European merchant. In the same way it is expected that you have procured, for the Indian gallery, small samples of all the products investigated by the Scientific Department. If you have not done so, the collections in the Indian gallery of the Institute will not be a counterpart of those exhibited in Calcutta. I consider it of the greatest importance that this should be the universal rule. If you are unable to procure and do not possess samples of all the goods consigned to the Scientific Department in the past, you will be good enough to let me know, and I shall then do my best, from our reserve stock, to supply the deficiencies.

But, in future, all Indian goods, whether indented for by the Scientific Department or by English merchants or by you, should be opened by your Department and the necessary quantities reserved in the Indian gallery to allow of future comparisons and verifications with the results published by this office and by the Scientific Department.

I have, &c.,
GEORGE WATT.

From Dr. George Watt to Sir Frederick Abel, Bart.

Indian Opium.

Indian Museum, Calcutta,
Sir, 11th August 1896.

I have the honour to send you, per Book Post, five copies of a complete review of all the correspondence, &c., on opium. The chief reason for my sending it is that the chemist may be able to learn all available particulars as to the sample of opium examined by him.

It is at present only issued as a proof, the type having been left standing. My intention is to publish it as an Appendix to the Report which will be furnished by the Scientific Department, together with a notice by myself on the botany of our cultivated poppies. The whole should form a valuable report on our opium and poppy cultivation.

There is, however, one point in which I would like your co-operation, and that is that before this or any portion of it or the full report of the chemist appears in the Journal of the Imperial Institute or any other English newspaper, it would be desirable to allow of the elapse of sufficient time for the report reaching India. It is very disappointing to me to have frequently to cancel papers on the preparation of which I have spent much time because I am anticipated by the Journal. Simultaneous publication might be easily enough secured by allowing one month to elapse after despatch of reports to India before they are printed in England. Naturally I cannot reprint articles that have already appeared and been received by the Indian press, and my portion of such papers have had to be cancelled.

I have, &c.,
GEORGE WATT.

Aconites.

(Report No. 12.—Aconites.) Indian Museum, Calcutta,
Sir, 18th August 1896.

I am directed to acknowledge your No. R. 333—1 (Flying Seal Series No. 95), dated the 28th July, as also Professor Dunstan's Report on *Aconitum heterophyllum*, and Dr. Jowett's very learned, able researches into the chemistry of that aconite. It has been decided to publish these papers in "The Agricultural Ledger," a copy of which is presented to every medical man throughout India. In this way full publicity will be given to the investigations. I may perhaps say, that as a member of the Indigenous Drugs Committee, I was present at a meeting recently held when Atis (*Aconitum heterophyllum*), after a careful consideration of the evidence on the subject, was relegated to the position of a mild tonic, but refused continuance of its former place as an antiperiodic. This view is thus in full accord with Professor Dunstan's and Dr. Jowett's researches, but the further therapeutic investigations that it is proposed to conduct will be looked forward to doubtless with much interest by the profession in India. The authoritative disposal of this medicine or rather its assignment to its true place in Indian pharmacy will be a subject for which a debt of gratitude will be due to yourself and the skilled investigators of the Scientific Department of the Institute.

I have, &c.,
GEORGE WATT.

British Lahoul Food Grains.

(Report No. 49.—Certain Food-stuffs.)

Indian Museum, Calcutta,
8th September 1896.

Sir,

With reference to your letter No. 392—60 (Flying Seal Series No. 45), dated the 15th May 1895, on the subject of certain food substances therein asked for, I take the opportunity afforded to say that a missionary in Kyelang, a town on the frontier of British territory, in a portion of British Lahoul that juts into Tibet, has recently furnished this office with a few samples of grains produced by him at his mission farm. As this farm is in one of the most Alpine regions of Indian cultivation,—at an altitude of from 10,000 to 14,000 feet,—it is believed an analysis of these grains would prove very instructive and interesting comparatively with the grains from the plains. I accordingly have assumed that you are likely to agree with me in this matter, and have despatched to you, through the Agent for Government Consignments, in box No. 55, 4 lbs. wheat (*Triticum sativum*), 3½ lbs. barley (*Hordeum vulgare*), and 3½ lbs. buckwheat (*Fagopyrum tataricum*); the last-named is the small grained alpine form, which should prove more specially interesting as it comes from such an high altitude.

I have, &c.,
GEORGE WATT.

From D. Hooper, Esq., to Sir Frederick Abel.

Hyoscyamus muticus.

(Report No. 50.)

Indian Museum, Calcutta,
15th September 1896.

Sir,

I have the honour to forward a small parcel of *Hyoscyamus muticus* collected in Sind.

This Indian species of *Hyoscyamus* is reported to be very virulent in its action when compared with *H. niger* of Europe, and on account of its poisonous properties it was named *H. insanus* by Dr. Stocks.

As the plant has never, to my knowledge, been chemically analysed, I think an examination of its alkaloids would form the subject of an interesting investigation in the Scientific Department of the Imperial Institute.

I am this week forwarding about 8½ lbs. of the dried plant (to the Agent, Government Consignments, for despatch) to London.

I have, &c.,
D. HOOPER.

Cassia auriculata.

(Report No. 6)

Indian Museum, Calcutta,
15th September 1896.

Sir,

With reference to your letter, No. 452—61 (Flying Seal Series No. 48), dated the 8th June 1895, and in continuation of this office letter, No. 1312—58 F.S., dated the 6th May last, I have the honour to enclose herewith invoice No. 14 for two cases numbered 52 and 53, containing further specimens of *Cassia auriculata* received from Madras, Hyderabad (Deccan) and Mysore for the Scientific Department at the Imperial Institute, London. The cases have this day been made over to the Agent for Government Consignments for despatch. As soon as I am informed by what vessel they are shipped I will let you know.

I also enclose three copies of Agriculture Ledger, No. 9 of 1896, on tanning materials and a manuscript note. The former gives all information regarding specimens of *Cassia auriculata* already despatched, and the latter of specimens referred to herein.

I have, &c.,
D. HOOPER.

Indian Tussar Silk.

Indian Museum, Calcutta,
28th October, 1896.

Sir,

With reference to your letters Nos. 190 and 200 (Flying Seal Series Nos. 65 and 66), dated the 12th and 17th December 1895 respectively, on the subject of the reeling of Indian Tussar silk, I have the honour to append, for your information, copies of replies that have been received on this subject from the managers of several silk mills in India.

I have, &c.,
D. HOOPER.

Enclosures in above.

Copy of Letter from the Poona Cotton and Silk Manufacturing Company, Limited, dated 7th July 1896.

With reference to your inquiry made in your letter No. 1984–86, dated 1st July 1896, we have the honour to inform you that we do not reel Tussar silk as well as Bengal silk, as it is not our line of business. We only manufacture silk cloth in our mills, which please note and oblige.

Copy of Letter from the Sassoon and Alliance Silk Mill Company, Limited, Bombay, dated 11th July 1896.

In reply to your favour of the 1st instant under No. 1975–86, I beg to inform you that the information you ask for regarding the degree of fineness of reeling of Tussar silk could, I believe, be obtained from some of the English or Native silk factories of Bengal and other parts of India, where the sole business of rearing and reeling off silk is carried on. Tussar is not used in this factory, but other sorts of best China and Bengal silk already reeled off into different deniers according to our requirements are used.

Copy of Letter, dated 15th July 1896, from the Manager, North-West Provinces Lister Grant, Dehra Dun.

Your No. 1976–86, of 1st July 1896.

With reference to the inquiry made in your above regarding the degree of fineness to which the reeling of Tussar silk is carried on in India, I have to inform you that we have never done very much with Tussar in this filature. We do not get Tussar cocoon in sufficient quantities in this part to allow of our attempting to reel this silk. We did get up a consignment from Bengal several years ago, but it was before I joined the firm, and there are no records of the results.

You have no doubt already applied to Messrs. Louis Payen & Co., of Berhampur, who, I know, deal largely in Tussar and reel it at more than one of their filatures. From them you are sure to get full and detailed particulars.

Copy of Letter, dated 6th July 1896, from the Secretaries and Treasurers, Bangalore Woollen, Cotton, and Silk Mills Company, Limited, Bangalore.

Replying to your No. 1972–86, we regret to say that we cannot give you the information required, as we are not yet working silk in our mills, our hands being pretty full with the woollen and cotton spinning and weaving.

Copy of Letter, dated 8th July 1896, from the Agents, Bangalore Woollen, Cotton, and Silk Company, Limited, Madras.

We are in receipt of your letter No. 1973–86 of the 1st instant, and in reply have to inform you that we have never started working silk at our

mills, and are therefore not in a position to reply to your inquiries regarding Tussar silk.

Copy of Letter, dated 3rd July 1896, from Messrs. George Henderson & Co., Calcutta.

In reply to your No. 1977–86 of 1st instant, we have the honour to inform you that we have had practically no experience in the reeling of Tussar silk, and so regret are unable to afford you the information you require.

Copy of Letter, dated 4th July 1896, from W. Shirreff, Esq., Sindoorie, Saduhati.

I have the honour to acknowledge receipt of your letter No. 1983–86 of the 1st instant, and which was forwarded on here to me by the Calcutta Manager of the Hong Kong and Shanghai Banking Corporation. In your letter you ask me for certain information as to the reeling of Tussar silk and other particulars connected with same, but I beg to state that the "Joradah Silk Filature" has been closed for many years now, so that I am sorry I am unable to give you any information as to the subject you write me about. Besides, I may mention that there are no Tussar silk cocoons reared in this part of the country.

Copy of Letter, dated 4th July 1896, from the Managing Agents, Bengal Silk Company, Limited.

We have the honour to acknowledge receipt last night of your No. 1979–86 of 1st instant, and in reply to your inquiries regarding Tussar we beg to state that—

(1.) So far as we know, this fibre cannot be reeled finer than 30 to 40 drs., whereas mulberry silk can be reeled easily down to 10 to 14 drs.

(2.) It is not in our power to state at what price per pound Tussar could be supplied. That depends entirely on the crop of Tussar cocoons which ripens in the cold season.

(3.) Some years ago this Company expended much time, trouble, and money in experimenting on Tussar reeling, but had to give it up as results were very unsatisfactory, both as regards the quality of the thread reeled and the price obtained for it in Europe.

Copy of Letter, dated 11th July 1896, from Messrs. Anderson, Wright & Co., Agents, "Rose Silk Filatures," Calcutta.

In reply to your letter No. 1981, dated 1st instant, we have to state that our experience has been that Tussar silk cannot be reeled successfully in this country as fine as 20 to 30 drs. It can be reeled from 30 to 40 drs., but even then it is very irregular in size, owing to the way the Tussar worm spins its thread. We must add that the filatures for which we are agents have not reeled Tussar silk for some years.

From D. Hooper, Esq., to Sir Frederick Abel, Bart.

Agave rigida *var.* sisalana.

(Report No. 19.)

Indian Museum, Calcutta,
11th November 1896.

Sir,

In continuation of this office letter No. 1226—76, F.S., dated the 29th April last, I have the honour to forward herewith copies of the marginally noted letters,* and to say that further samples of this fibre of *Agave rigida* var.

* No. 604, dated 8th June 1896.
No. 646, dated 10th October 1896.

sisalana from the Superintendent, Government Botanic Gardens, Saharanpur, North-Western Provinces, have been despatched to Mr. Royle, who has been requested to make them over to you if you consider a chemical analysis of the fibres is necessary.

The reason for sending the samples to Mr. Royle is that the opinion of experts and commercial valuation have been asked for by our correspondent. The method of preparation of the fibre would hardly have affected the ultimate composition.

I have, &c.,
D. HOOPER.

Copy of Letter No. 604, dated the 8th June 1896, from the Superintendent, Government Botanical Gardens, North-Western Provinces, Saharanpur (J. F. Duthie, Esq., B.A., F.L.S.), to the Reporter on Economic Products to the Government of India (Dr. George Watt, C.I.E.).

Agave rigida *var.* sisalana, A. americana, and A. vivipara.

I have the honour to acknowledge the receipt, with thanks, of your No. 1,593—76, dated the 1st June 1896, and copies of attached correspondence.

Agave rigida var. *sisalana* has only been in cultivation here for a few years, and the leaves have probably not yet attained to full length. Towards the end of the current year I shall send you a larger sample, and, I hope, of greater length of fibre.

I may add that the species is thriving here equally as well as *Agave americana* and *Agave vivipara*.

Copy of Letter No. 646, dated the 10th October 1896, from the Superintendent, Government Botanical Gardens, North-Western Provinces, Saharanpur (J. F. Duthie, Esq.), to the Officiating Reporter on Economic Products to the Government of India (Dr. George Watt).

Agave rigida *var.* sisalana.

Reverting to correspondence ending with my No. 604, dated the 8th June last, I have the honour to advise despatch of samples of the fibre of *Agave rigida* var. *sisalana* prepared in various ways. A slip of paper has been inserted in each bundle giving the weights of the leaves from which the fibre was extracted, process, &c.

On receipt of a report on the fibre by an expert, I shall be obliged if you will favour me with a copy.

D. Hooper, Esq., to J. R. Royle, Esq.

Indiarubber.

Indian Museum, Calcutta,
25th November 1896.

Sir,

With reference to your letters, dated the 10th January and 20th March 1896, on the subject of the supply of indiarubber, I now have the honour to append herewith, for your information, copies of the under-noted correspondence on the possible supply of rubber from Assam and Burma.

I have, &c.,
D. HOOPER.

No. 1850—32, dated the 19th June 1896.

From Reporter on Economic Products to the Government of India (Dr. George Watt) to the Conservator of Forests, Assam, Shillong.

I have the honour to forward, for your information, printed copies of letters from Mr. J. R. Royle, of the Imperial Institute, dated 10th January and 20th March 1896 respectively, on the subject of indiarubber, and to ask if you would be so good as to favour this office with your opinion as to whether Assam could now or in the near future be in a position to make commercial consignments.

I have further the honour to inquire if you could suggest the name or names of trustworthy private dealers in indiarubber.

I take this opportunity to draw your attention to paragraph 2 of this office letter No. 1347—32, dated 11th May 1896.

The favour of a reply at your convenience would greatly oblige.

No. 2327—32, dated the 28th July 1896.

From the Reporter on Economic Products to the Government of India to the Officiating Conservator of Forests, Tenasserim Circle, Rangoon.

I have the honour to acknowledge, with thanks, the receipt of your endorsement No. 727, dated 30th ultimo, giving cover to copies of letters from and to the Assistant Conservator of Forests, Southern Tenasserim Division, on the subject of indiarubber collected in the experimental garden at Mergui. I have the honour to state that we are at present instituting inquiries in Assam, and beg to append printed copies of letters received from the Curator, Indian Section, Imperial Institute, London, on the subject. With this object in view, I am desired to ask if you would be so good as to favour this office with your opinion as to whether Burma could now or in the near future be in a position to make commercial consignments.

The specimens furnished are too small to allow of their being chemically and commercially tested; but as a curiosity indicative of future trade, I am forwarding them to the Imperial Institute for favour of opinion. On the reply coming to hand I shall again communicate with you on the subject of these rubbers.

No. 1313, dated the 12th September 1896.

From the Officiating Conservator of Forests, Tenasserim Circle, Rangoon, to the Reporter on Economic Products to the Government of India.

With reference to your letter, No. 2327—32, dated the 28th July 1896, I have the honour to state that I have never heard of any rubber being collected in Lower Burma. I understand that all the rubber referred to by Messrs. Hecht & Co. comes from Upper Burma, and I would suggest that the two Conservators of Upper Burma be addressed on the subject.

No. K.—199, dated the 26th September 1896.

From the Conservator of Forests, Assam, Shillong, to the Reporter on Economic Products to the Government of India.

In reply to your letter, No. 1850—32, dated 19th June 1896, I have the honour to enclose a copy of letter, No. A.—117, dated 22nd instant, from the Deputy Conservator of Forests, Darrang Division, which gives the information you require as regards rubber collected in or exported through the forests in that Division.

I am now asking similar information from the officer in charge of the Lakhimpur Forest Division, which will be sent to you in due course.

The rubber out-turn of Assam, on which Government duty has been paid for the past season, has been as follows, in maunds :—

Forest Division.	Home.	Foreign.	Total.
Cachar	2	56	58
Goalpara	—	29	29
Kamrup	2	23	25
Darrang	—	1,168	1,168
Kowgong	2	—	2
Sibfagar and Naga Hills	28	11	39
Lakhimpur	615	1,233	1,848
Khasi and Jaintia Hills	65	—	65
Total	714	2,520	3,234

No. A.—117, dated Tezpur, the 22nd September 1896.

From the Deputy Conservator of Forests, Darrang Division, to the Conservator of Forests, Assam.

I have the honour to reply to your letter, No. D.—66, dated 23rd June 1896, and subsequent reminder.

2. The sources from which rubber is obtainable in this district are :—

(*a.*) The Charduar plantation.

(*b.*) Natural rubber trees within the district itself.

(*c.*) Foreign rubber, brought down from the Bhutia, Aka, and Dufla Hills.

3. The quantity at present procurable from the Charduar plantation is inconsiderable. Taking the first 10 compartments opened out prior to 1880, as fit for tapping without further delay, and assuming an average of 17 trees to the acre, we have 12,512 trees available for the supply of rubber. These may be tapped once in five years, that is to say, one-fifth of 12,512, or 2,502. are available annually. The quantity which each tree may be expected to yield is so far indeterminate, but a low estimate would be four chhattacks.

(The Inspector-General, in his report on the plantation, gives a much higher figure, viz., 20 seers to the acre, but Mr. Copeland does not agree with this.) This works out to 625 seers, or, roughly, 15½ maunds per annum, but this result is derived from a factor which is at least very uncertain, and is, moreover, directly proportional to the factor. It must be considered that year by year, as the trees mature, the yield may be expected to increase.

Taking Messrs. Carritt & Co.'s valuation of rubber from the plantation, a fair price, including all costs for this rubber delivered on board steamer at Tezpur, would be Rs. 105 per maund.

4. From source (*b*), *i.e.*, natural rubber within the district, the supply is uncertain. For the six years preceding 1892 no figures are available, but since then the following quantities were worked out :—

1892–93.	1893–94.	1894–95.
25 maunds.	9 maunds.	205 maunds.

During the current year no home rubber was tapped.

These figures show considerable fluctuations, and it would be unsafe to assume that the larger quantity worked out in 1894–95 represents the annual possibility of our forests. On the contrary, my experience of these forests goes to show that the rubber trees are slowly, but none the less surely, being killed out, and that no permanent supply can be depended on from this quarter.

5. Lastly, we have (*c*) foreign rubber. The figures for the last four years are :—

1892–93.	1893–94.	1894–95.	1895–96.
845 maunds.	971 maunds.	895 maunds.	1,168 maunds.

The increase in the last year is probably owing to work being stopped in the district forests.

These figures would show that from 900 to 1,000 maunds per annum of foreign rubber enter the district, and this supply may be kept up for the next five or six years. By that time the more accessible rubber forest across the border will have shared the fate of those within the district, the trees will have been tapped to death, and supplies will be available from a great distance and at increased cost, assuming that the rubber plant exists at all in the remoter and more elevated regions.

6. The quality of both home and foreign rubber, (*b*) and (*c*), roughly collected is, of course, inferior, as it contains an admixture of earth, small stones, twigs, &c. It is purchased locally by the Marwaris at from Re. 1 to Re. 1. 8a. per seer, and sold in Calcutta at Rs. 100 to Rs. 110 per bazar maund; to the cost price (Rs. 40 to Rs. 60 per maund) has to be added the Government duty at Rs. 12 or Rs. 20, according as the rubber is foreign or British, and Rs. 2. 5a. 6p. per maund freight by mail steamer.

The balance represents the trader's profit.

7. The following are the more important private dealers in rubber of this district:—

1. Mysing Meghraj Rai Bahadur.
2. Raten Chand Chatmal.
3. Chunilal Rahut Mal.
4. Surjamal Manikchand.

Nos. 3024—32 and 3025—32, dated the 20th September 1896.

From the Officiating Reporter on Economic Products to the Government of India to the Conservators of Forests, Eastern and Western Circles, Mandalay.

I have the honour to state that I am at present instituting inquiries in Assam on indiarubber, and beg to append printed copies of letters received from the Curator, Indian Section, Imperial Institute, London, on the subject. With this object in view, I am desired to ask if you would be so good as to favour this office with your opinion as to whether Upper Burma could now, or in the near future, be in a position to make commercial consignments? If so, I am to add that it is thought advisable to furnish this office with, say, about 5 lb. of rubber, which would be forwarded to the Imperial Institute for favour of chemical analysis and commercial valuation, and the result communicated to you in due course.

The favour of a reply at your early convenience is requested.

No. 3128—32, dated the 8th October 1896.

From the Officiating Reporter on Economic Products to the Government of India to the Conservator of Forests, Assam, Shillong.

I have the honour to acknowledge the receipt of your letter No. K.—199, dated the 26th ultimo, and to thank you for copy of letter No. A.—117, dated the 22nd September 1896, from the Deputy Conservator of Forests, Darrang Division, furnishing most interesting and useful information on the subject of indiarubber.

I would at the same time request to be favoured with the addresses of the dealers named in the Deputy Conservator's letter under reference.

No. 1537—25 B-1, dated the 8th October 1896.

From the Officiating Conservator of Forests, Eastern Circle, Upper Burma, Mandalay, to the Reporter on Economic Products to the Government of India.

With reference to your No. 3024—32, dated 30th ultimo, I have the honour to inform you that rubber from Upper Burma has for years formed an

important article of commerce, but the supply is now gradually and steadily failing.

As the Rangoon trade in rubber is *established*, there consequently seems no necessity for communicating to me any chemical analysis and commercial valuation of the rubber.

If you refer to the Annual Reports of the Forest Department for Burma during the last few years you will be able to trace the extent of the rubber export trade from Rangoon. The trade is not confined to this circle alone.

No. B.—223, dated the 3rd November 1896.

From the Deputy Conservator of Forests, Darrang Division, Tezpur, to the Reporter on Economic Products to the Government of India.

With reference to the concluding portion of your No. 3128—32 of the 8th ultimo, to the address of the Conservator of Forests, Assam. I have the honour to state below the addresses of the dealers named in this office No. A.—117, dated the 22nd September 1896:—

1. Mysing Meghraj Rai Bahadur, of Tezpur.
4. Raten Chand Chatmal, of Tezpur.
3. Chunilal Rahut Mal, of Gabru, Post Bindukuri, District Darrang.
4. Surjamal Manikchand, of Goriali Tea Garden, Post Borjuli, District Darrang.

No. A.—197, dated Dibrugarh, the 30th October, 1896.

From the Deputy Conservator of Forests, Lakhimpur Division, to the Conservator of Forests, Assam.

In reply to your memorandum No. G.—No. 191, dated 28th September 1896, and enclosures, I have the honour to forward the reply received from the Agent, Rubber Company, which gives the information required. You will observe that this Company comprises the leading rubber merchants. The Company mean to export cleaned rubber, which will, it is presumed, be the article best suited for Mr. Clerk's requirements.

Dated the 7th October, 1896.

Demi-Official from Messrs. Trotman & Co., Managing Agents, Assam Valley Rubber Company, Limited, Rehabari Post Office, Assam, to the Deputy Conservator of Forests, Lakhimpur Division.

Your favour No. B.—239. We are the Managing Agents of the Assam Valley Rubber Company, Limited, registered in London, and whose shareholders number amongst them the leading native rubber merchants of Assam.

This year, as the machinery was late in arrival, we shall only export about 11 tons cleaned rubber, but next year hope to export from 50 to 60 tons at least. As to price delivered in London or Calcutta we cannot at present answer you, as, until the rubber is cleaned, we cannot tell what the loss will be. Again, as our London friends wish us to go further into the matter of paying duty on the stones and dirt brought out with the rubber, it would at present be impossible to give you the quotations you ask for. We may, however, mention that samples sent home have been valued at from Rs. 2. 3. 0 to Rs. 2. 9. 0 per lb.

Documents are returned herewith as desired.

Memo. No. K.—228, dated Shillong, the 6th November 1896.

Endorsed by Conservator of Forests Assam.

Copy, with copy of the letter from the Agent, Assam Valley Rubber Company, Limited, forwarded to the Reporter on Economic Products to the

Government of India for information, with reference to his letter No. 1850—32, dated 19th June 1896, and in continuation of this office letter No. K.—199, deted 26th September 1896.

The addresses of the chief dealers in the Darrang Division will be forwarded on receipt from the Divisional Officer.

From Dr. George Watt, C.I.E., to Sir Frederick Abel, Bart.

Timber for Gunstocks.

(Report No. 28.) Indian Museum, Calcutta,
9th December 1896.

Sir,

I am directed to acknowledge your letter No. 508—1 (Flying Seal Series No. 103), dated the 11th November, giving cover to—

(1.) A report on the composition of certain Indian food-seeds, by Professor A. H. Church, M.A., F.R.S.;

(2.) A Report on the mechanical tests of the timber of *Lagerstræmia Flos-Reginæ*, by Professor W. C. Unwin, M.A., F.R.S.

These reports will doubtless prove of considerable value, and I am to say that they will be published at an early date in the "Agricultural Ledger." With reference to the experiments on *Lagerstræmia* timber, I am to say that it is believed such reports in future would be enhanced in value were it possible to compare or contrast the results obtained with similar experiments on a well known European timber that resembled the Indian one either in its physical properties or industrial value.

I have, &c.
GEORGE WATT.

Kashmir Food Grains.

(Report No. 49.) Indian Museum, Calcutta,
13th January 1897.

Sir,

In continuation of previous correspondence under No. 49 of the Programme of Operations, namely, on the subject of certain food grains required by Professor Church and Mr. Horace Brown for analysis, I have the honour to inform you that a supply of *Cicer soongaricum* has now been received from Kashmir, and will shortly be despatched to your address.

I take this opportunity to invite you to procure for this Office a chemical analysis of a sample of the pulse *Lathyrus sativus* which has also been obtained from Kashmir. An inquiry is at present being made by us into the subject of the injurious property of certain samples of the pulse. The sample which I propose to do myself the pleasure to forward to you has been obtained from a higher altitude than hitherto recorded for *Lathyrus*. I trust, therefore, it may not tax greatly the voluntary workers who have, at the request of the Institute, undertaken to analyse certain of the Indian food grains by my asking you to add *Lathyrus* to the list furnished by your Flying Seal Series, No. 45, of the 15th May 1895.

I have, &c.,
GEORGE WATT.

REPORT FOR 1897-98.

LIBRARY
OF THE
BOMBAY
BRANCH
OF THE
ROYAL ASIATIC SOCIETY.

1897-98.

From the CHAIRMAN of the SPECIAL SUB-COMMITTEE of the INDIAN SECTION of the IMPERIAL INSTITUTE to the UNDER-SECRETARY OF STATE FOR INDIA.

India Office, S.W.,
31st May 1898.

SIR,

As Chairman of the Special Sub-Committee of the Indian Section of the Imperial Institute, I have, in accordance with the India Office letter of the 13th November 1896, the honour to submit, for the information of the Secretary of State for India in Council, and for communication to the Government of India, the accompanying report on the administration of the section during the year 1897–8.

From the Curator's Report, it will be seen that the work of adding to the collection of commercial samples in the Indian Section is making satisfactory progress. The number of specimens of raw and manufactured products now exhibited amounts to nine thousand seven hundred and eighty-one.

The Loan Collection prepared for the Imperial Victorian Exhibition at the Crystal Palace, alluded to in last year's report, was completed and arranged during the year under review; and on its return, a selection of samples from the collection was made and presented to the Dublin Museum of Science and Art.

During the year, 258 specimens from the Indian Section sample stores were issued to the Scientific Department, and to experts for either chemical analysis or commercial examination. Reports on many of these samples have been prepared in the Scientific Department, and have been forwarded to India under Flying Seal. The inquiries addressed directly to the section have not largely increased in number; but good work is being done by making the special requirements of Indian commercial men known through the Chambers of Commerce of this and other countries, and by giving information to persons desirous of employing capital in India.

Professor Dunstan's exhaustive report on the examination of the samples of coal in the Indian Section, which is here reprinted, should prove of great service, as it supplies technical information, which has long been needed, concerning the chemical value of the produce of the various coal-producing districts of India.

Reports on *Podophyllum*, and on the alkaloids contained in the Indian aconites, have also been issued; and examinations of several other products of commercial importance have either been completed or are now in progress.

I have thought it would be interesting to add, as an appendix to the present report, extracts from the proceedings of the last annual meetings of the Governing Body and of the Fellows of the Imperial Institute.

I have, &c.
S. C. BAYLEY.

IMPERIAL INSTITUTE

INDIAN SECTION.

Curator's Report for the Year ending 31st March 1898.

I have the honour to submit the following report on the work done in the Indian Section of the Imperial Institute during the twelve months ending 31st March 1898.

2. *Indian Sub-Committee: (Honorary Members returned to India).*—The following honorary members of the Indian Sub-Committee have returned to India, viz. :—

Sir Alfred S. Lethbridge, M.D., K.C.S.I.
F. A. Nicholson, Esq., I.C.S.
H. Thirkell White, Esq., C.I.E.

3. *Additional Honorary Members.*—The following gentlemen have been added to the committee as honorary members, viz. :—

Sir E. C. Buck, K.C.S.I.
W. Coldstream, Esq., B.A.

4. *Meetings held.*—During the year the committee held 11 meetings, at one of which Sir Frederick Abel, Bart., K.C.B., was invited to attend. The detailed minutes of these meetings are printed at the end of this report.*

5. *Work done in connexion with the Collections.*—The arrears of work in connexion with the collections have been overtaken, and all specimens are now unpacked and prepared for exhibition and storage immediately after their arrival. During the past year 105 cases, containing about 1,078 new specimens, have thus been dealt with, in addition to the collection of stamps referred to in paragraph 8. Appendix A. shows the distribution of this year's specimens according to economic groups, and also the total number of specimens (9,781) now contained in the collection.

6. *New Show Cases.*—Two new show cases, one for the Dyes and Tans Section, and one for the Drugs Section, have been added to the Exhibition galleries. The exhibiting space allotted to India is fast filling up, and it has been found necessary to make these show cases of a new type to occupy central positions; they are hexagonal, and each has space for 150 index collection tins in the upper part, and about 100 boxes, or larger specimens, in the base.

7. *Work done in the Indian Pavilion.*—The re-lining of show cases and fittings in the Indian Pavilion alluded to in paragraph 11 of my report for 1896–7 has been completed, and the old show cases have been, as far as possible, repaired and renovated. They should, however, as stated last year, be replaced, at as early a date as possible, by air-tight and dust-proof cases.

8. *Postage and Telegraph Stamps.*—In addition to the specimens of products referred to above (*see* paragraph 5), a fine collection of postage, telegraph, and other stamps, post-cards, and registered envelopes has been received from India, and these, as well as some received from the India Office, have been mounted and arranged together with those which were made over to the Indian Section of the Imperial Institute after the Colonial and Indian Exhibition of 1886.

The whole collection now comprises 605 specimens, and fills 15 large glazed frames; it appears to be of considerable interest to many of the visitors.

9. *Sir Edward Durand's Loan Collection.*—The large collection of old Nepal brass-ware, which had been lent for the last five years to the Indian Section by Colonel Sir Edward Durand, Bart., C.B., has now been returned at his request; the show cases in the Indian Pavilion in which it was exhibited have for the present been filled with cotton fabrics.

* The Minutes are not reprinted with the present Papers.

10. *Work done in Sample Store Room.*—Further progress has been made in the sample store room; another double storage rack has been constructed, and old show cases have been converted into suitable storage cases around the room. The need of additional storage space, alluded to in paragraph 15 of my report for 1896–7, is beginning to be felt.

11. *Loan Collection to the Crystal Palace.*—The Crystal Palace Company having applied for help in forming an Indian Court at the Imperial Victorian Exhibition, which was held from May to September 1897, a loan collection of about 700 specimens of raw products and a few textile fabrics was prepared in the Indian Section here, and fitted up at the Crystal Palace. Models of Indian troopships, maps, and photographs, were contributed by the India Office, and private individuals lent various objects of interest.

12. *Collection for the Dublin Museum.*—Professor Johnson, of the Dublin Museum of Science and Art, having applied for numerous specimens of vegetable products to complete his museum collection, the committee approved of his being allowed to select such specimens as could be spared after the return of the collection lent to the Crystal Palace. He eventually selected about 250 specimens, and of these he received 226, the remainder being specimens of which there was no further supply in store.

13. *Samples issued to the Scientific Department or to Experts.*—During the year the issue of samples for examination or valuation by the Scientific Department of the Imperial Institute, or by outside experts, has been continued.

The following have been the principal samples issued, viz.:—

Economic Group.	No. of Samples Issued.
Food substances	2
Narcotics	10
Oils and oilseeds	77
Medicines	23
India-rubber	9
Dyes and tans	80
Fibres	2
Minerals (coal principally)	42
Miscellaneous	13
Total	258

Reports on many of these samples have been prepared in the Scientific Department, and have been forwarded to India, under Flying Seal, through the India Office.

14. *Report on "Mangrove Cutch."*—The Government of India having addressed the Secretary of State on the subject of the Mangrove Bark extract known, commercially, as Borneo mangrove cutch, concerning which they were desirous of having some information, the matter was referred to the Indian Section of the Imperial Institute, and the Curator obtained samples of Borneo and Ceylon mangrove cutch, and these have been forwarded to India. Samples of Indian mangrove barks and extracts have been supplied to the Scientific Department for examination.

15. *Commercial and General Inquiries.*—The commercial inquiries have been chiefly from small merchants desirous of being placed in direct communication with Indian firms of exporters, in order that they may be enabled to procure produce at cheaper rates than if they obtained it through London agents; these applications have been forwarded to Dr. Watt, and by him sent on to the Chambers of Commerce.

Among general inquiries there have been a number of applications from young men seeking information concerning different parts of India in which they have been offered commercial appointments, and from others asking whether there are openings for the employment of a small capital; these applicants have been allowed access to works of reference, or advised as to the best source from which to obtain the information sought.

Several applications for "replicas" of Jeypore brass-ware and pottery have also been received and forwarded to India, but, on the whole, there has not been an increase in the total number of inquiries made.

16. *Correspondence.*—Correspondence passes regularly between the Reporter on Economic Products and the Secretary to the Indian Sub-Committee on matters connected with the collections. Correspondence "under Flying Seal" also passes between the Reporter on Economic Products and the Honorary Secretary and Director, Imperial Institute. A list of the Flying Seal correspondence is appended (*see* Appendix B.), and a selection of the more important Flying Seal letters is printed in Appendix H.

J. R. ROYLE,
Secretary Indian Sub-Committee and
Curator Indian Section.

18th April 1898.

FINANCIAL STATEMENT.

Estimated Expenses for the year 1898–9.

	£	s.	d.	£	s.	d.
Heading A.—Salaries of Curator's Staff:—						
1 Clerk, at 70*l.* per annum (rising to 100*l.*)	70	0	0			
Senior attendant, at 34*s.* weekly	88	8	0			
Junior attendant, at 28*s.* weekly	72	16	0			
Boy messenger, at 10*s.* weekly	26	0	0			
Occasional extra help	9	2	0			
				266	6	0
Heading B.—General Expenses of Indian Section:—						
Petty cash, at 5*l.* monthly				60	0	0
Tins, bottles, jars, &c., for specimens	15	0	0			
Two new show cases	64	0	0			
Re-polishing timbers, &c.	8	0	0			
Carpenters and painters: general work in section	15	0	0			
Spirits of wine, paint, varnish, cleaning materials	10	0	0			
				112	0	0
Tins for storage of surplus samples	13	13	0			
New storage rack and improvements in stores, including alteration of store-room partition	31	10	0			
				45	3	0
Office fittings				10	0	0
Margin for contingencies				56	11	0
Total of Headings A. and B.				550	0	0
Heading C.—Contributions to Imperial Institute:—						
Annual grant for general purposes of Institute				750	0	0
Annual grant for scientific investigations				100	0	0
Heading D.—Curator and Assistant Curator:—						
Curator				500	0	0
Assistant Curator (*appointment in abeyance*)				—		
Total				£1,900	0	0

Appendices to Mr. J. R. Royle's Report.

Appendix A.

Statement showing number of Specimens received in Indian Section between 1st April 1897 and 31st March 1898.

Name of Group.	No. of Specimens.	Remarks.	
Dyes and Tans - - -	441	Number of specimens received from India 31st March 1897	8,769
Gums and Resins - - -	112		
Food Stuffs - - -	98	Number of specimens received during current year - -	1,078
Oils and Oil-seeds - - -	145		
Fibres - - - -	97		9,847
Minerals - - -	47		
Miscellaneous, Index Collection -	103	Number of old specimens eliminated from the collection -	66
Textile Fabrics - - -	35		
Total number of exhibits received since 1st April 1897 - -	1,078	Total number of specimens received* - - -	9,781
Total number of cases received since 1st April 1897 - -	105		

* In addition to the collection of Stamps.

Appendix B.

Correspondence under Flying Seal since April 1897, between Sir Frederick Abel, Honorary Secretary and Director of the Imperial Institute, and Dr. Watt.

(1.) Letters from Sir F. Abel to Dr. Watt.

Date.	Subject.	Date.	Subject.
1897.		1898.	
May 29	Asking for a few pounds of pineapple fibre for testing.	Jan. 6	Report on Oryza coarctata seeds as a food-grain.
June 3	Report on a sample of rubber.	„ 10	Acknowledging letter of the 10th January *re* pineapple fibre,
„ 14	Report on Phœnix paludosa fibre.	„ 18	Acknowledging letter of 30th December *re* 15 lb. of Aconite roots.
July 9	Report on mica and mica preparations.	„ 19	"Pyinma" wood as a material for gun-stocks.
„ 22	Enclosing a paper (Chemical Society) on Aconitine by Prof. Dunstan and Mr. F. H. Carr.	Mar. 7	Stating that a report on coal would be sent at an early date.
„ 22	Stating that a report on coal analyses will be sent later on.	„ 7	Acknowledging letter of 10 February *re* Oryza coarctata.
„ 30	Report on a sample of rubber.	„ 7	Stating that a sample of Calotropis gigantea bark fibre shall be examined when received.
Sept. 18	Report on a sample of Calotropis procera floss.	„ 11	Giving names of brokers and experts who have reported on samples of rubber.
Oct. 30	Report by Prof. Dunstan on Aconitum ferox and A napellus.	„ 11	Acknowledging letter of 10th February *re* Malwa opium.
Nov. 4	Report on pineapple fibre.	„ 12	Asking for information *re* edible oils.
„ 15	Enclosing copies of papers by A. G. Perkin. on the yellow colouring principles of various tannin matters.	„ 25	Enclosing a report by Prof. Dunstan on the Indian Coal Supply.
Dec. 8	Acknowledging letter of 13th November.	„ 26	Stating that Professor Church is willing to examine Flemingia vestita tubers when received.
„ 22	Asking for particulars about two jars of opium received.	„ 30	Acknowledging letter of the 3rd March *re* "Pyinma" wood for gun-stocks.
„ 22	Acknowledging letter of 2nd December *re* Aconites.		
„ 30	Report on nine samples of rubber.		

(2.) Letters from Dr. Watt.

Date.	Subject.
1897.	
April 22	Cost of producing Phœnix paludosa fibre.
May 12	Asking for analysis of a sample of fluid used by Morinda dyers.
April 7	Asking for a report on a sample of rubber.
May 5	Sending four samples of catechin and catechu-tannin for report.
April 22	Asking for information as to the best method of cleaning Corrundum, and forwarding specimens.
May 25	Sending a sample of rubber for report.
July 6	Further sample of pineapple fibre will be sent.
„ 13	Acknowledging report on a sample of rubber
„ 18	Acknowledging letter of 22nd July *re* report on coal.
„ 18	Acknowledging receipt of a paper on Aconites by Dunstan and Carr.
„ 11	Acknowledging report on Mica.
„ 11	Asking for report on samples of rubber.
„ 4	Sending 3 lbs. of pineapple fibre.
„ 4	Acknowledging receipt of a memorandum on Phœnix paludosa fibre.
Sept. 29	Advising despatch of rubber samples.
„ 1	Acknowledging report on samples of rubber.
„ 23	Sending five copies of "Programme" of collections.
„ 29	Advice of two jars of opium.
Nov. 13	Acknowledging report on Calotropis procera floss.
Dec. 2	Acknowledging report by Prof. Dunstan on Aconites.
1897.	
Dec. 9	Acknowledging report by A. G. Perkin on various tannin matters.
„ 22	Acknowledging report on pineapple fibre.
„ 22	"Pyinma" wood for gun-stocks.
„ 30	Advice of 15 bs. Aconite roots.
„ 30	Experimental cultivation of Pineapple fibre.
1898.	
Jan. 6	Aconite roots mentioned in 2865.
„ 6	Advice of 20 lbs. Aconitum napellus.
Feb. 3	Acknowledging report on rubber samples, and asking for names of brokers and experts.
„ 10	Mistake in sending jars of opium.
„ 10	Acknowledging report on Oryza coarctata grain.
„ 7	Advice of 8 lbs. of bark fibre of Calotropis gigantea.
„ 10	Asking that report on coal may be no longer delayed.
1898.	
March 3	"Pyinma" wood for gun-stocks, a log will be sent.

IMPERIAL INSTITUTE.

SCIENTIFIC AND TECHNICAL DEPARTMENT.

REPORT by the Director, Professor WYNDHAM R. DUNSTAN, M.A., F.R.S., Sec.C.S., on Investigations conducted for the Government of India during the Year ending 1st April 1898.

During the past year a large number of Indian investigations have been carried on in the Scientific Department of the Imperial Institute. The results of the following inquiries have formed the subjects of reports which have been already forwarded to India.

Indian Coals.—A report has been made on the composition and quality of samples of coal taken from the principal coal deposits of India under the direction of Dr. Watt. It is shown that almost every variety of coal occurs in India, whilst some of the coal is of excellent quality. It is hoped that the publication of this report may be the means of directing attention to the opportunities of industrial development which India offers through her enormous coal supply.

Indian Podophyllum.—This investigation is now complete. The "Journal of the Chemical Society" for April 1898 contains a paper ("The Chemical Constituents of Indian and American Podophyllum," by Professor Dunstan and Mr. T. A. Henry) in which a full account is given of the chemistry of the subject. It is shown that the principal constituents of Indian podophyllum (*Podophyllum emodi*) and of American podophyllum (*Podophyllum peltatum*) are identical, whilst a therapeutic trial of the resin (*podophyllin*) prepared from the Indian plant has proved it to be of at least equal value as compared with that prepared from the American plant which is so largely employed in medicine. Since the best samples of the Himalayan plant received from Dr. Watt contain more of this resin than the American plant, its extraction and sale ought to prove to be a profitable undertaking. Since attention was drawn to the subject in a previous report, some demand for the Indian drug has already arisen in this country. Incidentally it was found that the plant also contains the same yellow colouring matter (*quercetin*) as quercitron bark, which is of considerable value as a dye. Indeed, dying experiments made by Professor Hummel have proved that the plant itself is a satisfactory yellow dye-stuff.

The extraction both of the drug (*podophyllin*) and of the dye (*quercetin*) from Podophyllum emodi, which is very abundant in India, ought to be remunerative; and, as the processes of extraction are simple, there seems to be no reason why these operations should not be carried out in India. Podophyllin, at present almost exclusively extracted from the American plant, finds a large sale in Great Britain and in nearly all European countries.

Indian Dye-stuffs.—A preliminary account of the chemistry of *Delphinium Zalil* has been published in the Proceedings of the Chemical Society of March 1898 by Mr. A. G. Perkin and Mr. J. A Pilgrim.

Indian Aconites.—A report has been made on the alkaloids contained in several Indian aconites, especially in *Aconitum ferox* and its varieties. Further experiments are in progress. In connexion with this inquiry it may be mentioned that a memoir on the physiological action of some of the principal aconite alkaloids has been communicated to the Royal Society ("The Pharmacology of Aconitine, Diacetylaconitine, Benzaconine, and Aconine," by Professors Cash and Dunstan "Proceedings of the Royal Society," 1898). The complete paper has been ordered for publication in the "Philosophical Transactions." One important practical outcome of this investigation is the establishment of the fact that the subsidiary alkaloids, which to a variable extent accompany the principal alkaloid, aconitine, in the plant, and into which aconitine is easily resolved, exert an opposite physiological action,

which points to the conclusion that a preparation, not of the plant, but of the pure alkaloid aconitine, would be the most trustworthy for medical use. Aconitine is obtained from *Aconitum napellus*, which is not so abundant in India as the aconite of Nepaul, the principal alkaloid of which, pseudaconitine, is now being carefully compared with aconitine in reference to its physiological action.

Indian Food Grains.—A report on the chemical analysis of *Oryza coarctata* by Professor Church has been furnished.

The following inquiries are still in progress:—

Indian Opium.—In response to the suggestion that further investigations should be made with the view of improving the quality of Indian opium, and enabling it to compete, for medicinal purposes in Europe, with Turkey opium, the Government of India has made the reply (Despatch from Lord Elgin to the Secretary of State, No. 46, of 1897, dated 29th June 1897) that they do not think it desirable to move in this direction for the reason that the result would probably be detrimental to their opium trade with China. For the same reason it is not desired to utilise any except waste opium for the extraction of the valuable alkaloid morphine, which, as I pointed out in my Special Memorandum on Indian Opium, dated 1st September 1896 (Annual Report on Indian Section, 1896–7, p. 37 of the present reprint), is now more extensively used in medicine than opium itself, and probably might be profitably manufactured in India. Under these circumstances, the work on Indian opium will shortly be brought to a conclusion by a report on the analyses of opium collected in the various districts of India under the supervision of Dr. G. Watt.

Indian Edible Oils.—A report will shortly be made on the physical and chemical characteristics of the extensive series of Indian oils, and also on their probable commercial value.

Indian Tanning Materials.—A report is in course of preparation which will deal with the results of the examination of a large number of different tanning materials collected in India, and especially with the question of the influence of age on the tanning value of the plants.

Indian Hyoscyamus.—The chemical examination of the constituents of *Hyoscyamus muticus* is approaching completion.

Indian Hemp.—The progress of this inquiry has been delayed for want of material, for which application was made more than a year ago. The Government of India now suggest (Despatch from Lord Elgin to the Secretary of State, No. 65, of 1897, dated 23rd September 1897) that this investigation might be postponed for the present. It should be remembered, however, that the important question as to the proper methods of producing and storing Indian hemp preparations cannot be settled until more is known of the nature and properties of the active principle.

Technical and commercial reports by the expert referees on the following materials have been forwarded to India through Sir F. Abel:—

India-rubber from Burma.—An encouraging report, pointing out the necessity for adopting better methods of collection if the material is to come into European markets, was received and forwarded.

Mica and Mica Preparations.—An unfavourable report on some special preparations, consisting of mixtures of powdered mica with vaseline and mineral oil, was forwarded.

Calotropis Floss and Pine-apple Fibre.—A very satisfactory report on the pine-apple fibre from Assam was made by the expert referee, and a further supply asked for.

It will be seen from the present report that, during the past year, considerable progress has been made in the prosecution of a number of important Indian inquiries. It is evident that much of the information now furnished by the Department is capable of being turned to important practical and commercial account in India, and that it may be the means of opening up or extending Indian trade with this and other European countries in a variety of natural products.

WYNDHAM R. DUNSTAN,
Director, Scientific Department.

22nd April 1898.

APPENDICES to Professor DUNSTAN'S Annual Report.

APPENDIX C.

REPORT on INQUIRIES conducted for the GOVERNMENT OF INDIA in the Scientific and Research Department of the Imperial Institute during the Half-year ending 30th September 1897.

As I have so recently reported on the work now being conducted for the Government of India in the Scientific and Technical Department of the Imperial Institute (*see* Annual Report, Indian Section, Imperial Institute, 1897, page 25), I need now only indicate the further stage to which certain inquiries have been carried, and mention the new investigations which have been commenced since the date of that report.

Indian Aconites.—This inquiry has been further proceeded with, and a full report on the work which has been done will be made during the coming year.

Indian Opium.—This investigation is delayed pending the receipt of the further samples which were asked for in my special memorandum on Indian opium, transmitted through Sir Frederick Abel on 9th September 1896, and again referred to in my report of January 1897. I have recently again drawn attention to the fact that no reply has yet been received to this request for information and materials in connexion with a subject which seems likely to be of considerable importance to India.

Indian Podophyllum.—The chemical investigation of this drug is nearly completed. An account of the results which have been obtained will be published as soon as the physiological and therapeutical examination of the separate constituents has been brought to a conclusion at St. Thomas's Hospital.

Indian Tanning Materials.—The laborious work of examining the various samples of Indian tanning materials is being actively proceeded with, and a report will be made as soon as all the analyses have been finished. The mangrove barks and extracts prepared from them have now been included in this inquiry.

Indian Coals.—The examination of the large number of specimens of Indian coal is now nearly completed, and the report will be presented as soon as the "Review of the Mineral Production of India for 1896" has been received in this country, so that the value of the coals may be considered in connexion with recent reports and statistics of the Indian coal supply.

Indian Edible Oils.—The preliminary examination of these oils will probably be finished early in the year, when a report will be presented.

Indian Dyeing Materials.—A complete examination of the constituents of *Delphinium Zalil* has been undertaken by Mr. A. G. Perkin, of the Dyeing Department of the Yorkshire College, Leeds.

Indian Medicinal Plants.—Investigations have been commenced of the constituents of Indian Henbane (*Hyoscyamus muticus*), of the seeds of *Calotropis procera,* and of the pressed cake from castor-oil seeds.

Indian Hemp.—A systematic investigation of the constituents o Indian hemp has been commenced, but no further progress can be made until the materials asked for in my report of 7th January 1897 have been received.

WYNDHAM R. DUNSTAN,
19th October 1897. Director of the Scientific Department.

Appendix D.

Quarterly Report by the Director of the Scientific Department on the Inquiries conducted for the Government of India in the Scientific Department of the Imperial Institute.

I have to report on the progress that has been made since the date of my last quarterly report of 19th October 1897 with the scientific and technical work which is being conducted for the Government of India by the Imperial Institute, and to give an account of the new inquiries which have been instituted since the date of that report.

Indian Aconites.—This inquiry has made considerable progress, chiefly in the direction of ascertaining the composition and properties of the various alkaloids contained in the different species of Indian aconite, and a report on the chemical constitution of five different specimens of this plant has been forwarded to India by Sir Frederick Abel under Flying Seal (No. 120, 30th October 1897). A paper on the "Pharmacology of Aconitine, Diacetyl-"aconitine, Benzaconine, and Aconine, considered in relation to their "Chemical Constitution," has just been communicated to the Royal Society by Dr. Cash, F.R.S., Regius Professor of Materia Medica in the University of Aberdeen, and myself. It is expected that several other papers will be communicated during the course of the present year, whilst work is now being commenced on the specimens which have been recently received from Dr. Watt.

Indian Opium.—As mentioned in my last report, the further progress of this investigation was delayed pending the receipt of samples which were asked for in a special memorandum on Indian opium, dated 9th September 1896. A despatch from the Government of India has been recently received, from which it appears that they do not favour the suggestion that Indian opium, if procurable of sufficient quality, might be substituted throughout Europe for the opium, for the supply of which Turkey now derives a considerable revenue. Under these circumstances it does not appear to be worth while to proceed any further with my suggestion that a trial of Indian opium should be made at certain of the London hospitals. With reference to my suggestion, as to the manufacture of morphia and other alkaloids from opium, that we might be able to advise the Indian Government on the best methods of manufacturing and disposing of these valuable drugs, it appears from the despatch that it is wished to limit the extraction of alkaloids to waste products of the opium manufacture, and although it is stated that "information that might lead to "improvement in the processes by which these by-products are recovered "would be valuable and welcome," we are not informed that any data will be supplied as to the methods now in vogue for this purpose, in the absence of which it is, of course, impossible to suggest any improvements. As the matter stands at present it seems that all that is needed is a scientific examination of the various opium samples that have been received from India through Dr. Watt, without reference to the commercial or medicinal utilisation of the opium in this country or elsewhere in Europe. The samples of Malwa opium recently received from Dr. Watt will shortly be submitted to analysis.

Indian Podophyllum.—A complete report on the chemistry of this drug is now in course of preparation.

Indian Tanning Materials.—A number of samples of various tanning materials recently received from Dr. Watt are being examined, and it is hoped that this inquiry will be completed during the course of next year.

Indian Coals.—As stated in the last report, the analyses of Indian coals have been completed, but the report cannot be prepared until the "Review of the Mineral Production of India for 1896," compiled by Dr. Watt, has been received. Without the information as to the exact localities in which these coals occur, the depths of the seams, and other particulars, the percentages of the various constituents of the coal would be of little value to those who wish to be commercially interested in the important question of the utilisation of the Indian coal supply.

Indian Edible Oils.—A report on the chemical examination of a large number of these oils is now in course of preparation.

Indian Dyeing Materials.—Reports are shortly expected on various Indian dyeing materials from Professor Hummel and Mr. A. G. Perkin of the Yorkshire College, Leeds.

Indian Medicinal Plants.—In connexion with the investigation of constituents of Indian Henbane (*Hyoscyamus muticus*), which I stated in my last report had been commenced, the inquiry has now been extended to a careful comparison of the constituents of the plant with those of English Henbane (*Hyoscyamus niger*), with especial reference to the question as to whether the Indian plant might serve as a source for the production of certain mydriatic alkaloids which are largely employed in medicine.

Indian Hemp.—This investigation, with which some progress has been made, is now delayed pending the receipt of the materials which were asked for in my report of 7th January 1897, when it was suggested that a special grant should be made to meet the expenses of this important inquiry.

Technical Reports on Indian Products.—Technical and commercial reports on the following subjects by the expert referees attached to the Scientific Department have been forwarded to India under Flying Seal by Sir Frederick Abel:—

India-rubber from Burma.
Mica and Mica Preparations.
The Silk-floss of Calotropis procera.
Pine-apple Fibre.
Oryza coarctata as a Food Grain.

WYNDHAM R. DUNSTAN,
27th January 1898. Director, Scientific Department.

APPENDIX E.

REPORT on the FIBRE of *Phœnix paludosa.*

With reference to Dr. Watt's letter (F. S. S. 863–85A), dated 22nd April 1897, requesting that the further attention of the Scientific Department may be drawn to the subject of the possible utilisation of the stem fibre of *Phœnix paludosa* which had been examined in October 1895 and reported to be of small commercial value (F. S. S. No. 58), I have to say that it appears to me that the only directions in which an improvement of the fibre might be effected are in ascertaining the exact time of year at which the crop should be cut, and in considering whether the method of treating the fibre could be improved.

I have again submitted a sample of the original consignment of the fibre received in 1895 to our fibre expert, asking for his opinions on these points, and drawing his attention to the possible value of the leaves of this plant for paper-making. In reply, he states, that having examined the fibre he finds it very "sere" and brittle, and not saleable in this country in its present condition. Comparing the condition of the fibre at the present time with its condition two years ago, it would appear that considerable deterioration has taken place. He points out that with very rare exceptions stem fibres are of little value, though possibly an improved fibre might be obtained if the plants were cut down before they had reached maturity, and that probably a still better fibre could be obtained from the leaves. With regard to the utilisation of the leaves for paper-making he remarks that, with ample supplies of wood-pulp and other good materials at very low prices, the leaves would probably have only a local value for paper-making and would not bear the cost of transit and freight to Europe.

WYNDHAM R. DUNSTAN.

Appendix F.

Report of the Constituents of some Indian Aconites.

In continuation of previous investigations already reported (Report on *Aconitum heterophyllum*, dated 25th July 1896; Second Quarterly Report dated 7th January 1897; Annual Report on Investigations conducted for the Government of India for the year ending 1st April 1897; F. S. S. letter, No. 116, dated July 22nd 1897) of the constituents of the various aconites occurring in India, a qualitative and quantitative examination has been made of the alkaloids contained in specially collected samples of the roots of Nepaul aconite (*Aconitum ferox*) and of *Aconitum napellus*, which have been received from the Reporter on Economic Products to the Government of India. (F. S. S. No. 1369/116 from R. E. P., dated 18th May 1896).

Nepaul Aconite (*Aconitum ferox*).—Five samples of roots have been examined, one from the Punjab, the other four from Bengal. With the exception of one of the latter specimens (No. 6182), all these roots furnished a crystalline alkaloid which corresponded in every respect with the highly poisonous "pseudaconitine" of which an account has already been published by Mr. F. H. Carr and myself (Journal of the Chemical Society, 1897). A further description of the properties and physiological action of this alkaloid will shortly be communicated.

A crystalline alkaloid was extracted from one specimen of roots (No. 6182), certain properties of which do not exactly correspond with those of pseudaconitine. If a further supply of these roots can be procured I should like to examine this alkaloid more fully.

The quantity of pseudaconitine contained in each sample has been estimated by a process which consisted in the extraction of the alkaloid and the separation from it by hydrolysis, of the veratric acid; by these means the following results were obtained:—

Indian Invoice Number.	Imperial Institute Number.	Name.	District.	Percentage of Alkaloid.
6806	7149	Aconitum ferox -	Bashahr, through the Conservator of Forests, Punjab.	·40
6813	7151	A. ferox, var. crassi caulis.	Through the Deputy-Conservator of Forests, Darjiling, Bengal.	·41
7037	7153	A. ferox - -	Do. do.	·39
7038	7154	A. ferox, var. crassi caulis.	Do. do.	·50
6812	7150	A. ferox - - -	Do. do.	·35

These results were interesting in revealing a larger percentage of pseudaconitine than has hithereto been supposed to occur in the roots of this plant, in one case as much as half per cent. being present. These roots, therefore, contain a larger proportion of pseudaconitine than the roots of the closely allied *Aconitum napellus* contain of aconitine.

The investigations which are being conducted by the Scientific Department render it probable that Nepaul aconite and its active alkaloid, pseudaconitine, will prove to be as valuable medicinally as the *Aconitum napellus* and its active alkaloid, aconitine, which are now almost exclusiveiy employed in Europe. At present there is no large demand for Nepaul aconite in the English market, chiefly because of the uncertainty which has hitherto surrounded the nature of its constituents and their precise medicinal action; even the exact source of Nepaul aconite is not yet settled; although the plant is usually regarded as *Aconitum ferox* there is some reason for doubting whether this is the case. I hope that the attention of the Botanical Survey of India will be directed to this question.

Aconitum napellus.—The one sample of the roots of this plant came from Kaghan, Punjab. On examination the roots were found to contain the same

constituent, aconitine, as the plant furnishes when grown in Europe. The proportion of this alkaloid in the present specimen is very small, and the sample compares unfavourably with the roots of European origin which appear in the English market.

I shall be glad to receive for examination specimens of the roots of these two plants from other districts of India, and also of the roots of any other species or varieties of aconite than those with which we have already been supplied.

A further report will shortly be made on the examination of the later series of aconite specimens, received in June 1897, including a preliminary account of the constituents of *Aconitum palmatum*.

WYNDHAM R. DUNSTAN.

28th October 1897.

APPENDIX G.

REPORT by Professor WYNDHAM R. DUNSTAN, M.A., F.R.S., Director of the Scientific Department, on the Coal Supply of India.

Introductory.

At the instance of the Government of India an examination has been made in the Scientific Department of the Imperial Institute of a number of large samples of coal taken from some of the principal seams in India, many of which have not been previously examined. The coals were collected under the supervision of Dr. George Watt, C.I.E., the Reporter on Economic Products to the Indian Government. The two series of samples have been received. The first series formed the subject of a report from the Scientific Department in 1895, which has been printed in the Indian "Agricultural Ledger," No. 2 of that year, (*see also* Imperial Institute Journal, Vol. 1, No. 4, p. 162, and "Annual Report of the Indian Committee of the Imperial Institute," India Office, 1897). The results of the analyses of this first and smaller series are, for convenience of reference, included in the table appended to this Report, being marked by an asterisk. The second, larger, and more representative series, forms the chief subject of the present Report.

Literature.

In addition to the Report above-mentioned the following works are of importance in connexion with the history, occurrence, distribution, production, composition, and characteristics of Indian coal:—"Memoirs of the Geological Survey of India," 1871-97, papers by T. W. H. Hughes, F. R. Mallet, W. King, F. Noetling, T. De la Touche, P. N. Bose, &c.; Ball's "Geology of India," Vol. III., 1881; Watt's "Dictionary of the Economic Products of India," article "Coal," by Dr. W. Saise, Manager of the East India Railway Collieries; "The Karharbari Coalfield, with some remarks on Indian Coals," by Dr. W. Saise, Proceedings of the North of England Institute of Mining and Mechanical Engineers, 1880; "Annual Review of Mineral Production in India" for 1896, by Dr. George Watt, C.I.E., Calcutta, 1897; "Imperial Institute Series of Handbooks of Indian Commercial Products, No. 9, Indian Coal," Calcutta and Imperial Institute, London, 1893.

It will be convenient to briefly summarise here the chief points in connexion with the occurrence, distribution, production and characters of Indian coal.

Occurrence.

From the exhaustive investigations made by the Geological Survey of India it appears that the Indian coal measures belong, not like those in England and Wales, to the carboniferous period, but chiefly to the upper palæozoic and lower jurassic formations. The coal occurring in the Peninsular, south of the Indo-Gangetic plains, belong to the lower gondwana period, whilst the extra-peninsular coal, *e.g.*, that of Assam and Upper Burmah, is principally cretaceous

and tertiary. This difference in the occurrence of coal in India and Great Britain is important in accounting for many of the peculiarities in the composition and characters of Indian coal as compared with English and Welsh coal.

Distribution.

Coal is widely distributed throughout India, except in Bombay and Sind, the North-West Provinces and Oudh, Rajputana, and Mysore, where the mineral is either scantily distributed or entirely absent. Many of the coal-fields have not been fully explored and only a small proportion of the total known coal area is at present worked. The seams in Bengal and Assam are frequently from 50 and 80, to as much as 180, feet in thickness. The pits are often of considerable depth; at present the deepest appears to be about 700 feet. In many cases the working of the seams leads to the escape of little or no fire-damp, so that the miners are able to work with naked lights. In 1895, 235 collieries were at work, but in 1896 only 172 were in active operation. At the present time Bengal produces more than three-fourths of the coal mined in India. The localities and extent of the coal production in India may be learned from the following summary, taken from the last published returns (1895 and 1896). The chief coal localities are figured (roughly to scale) in the map which is appended to this Report. This map is one prepared for the "Handbook" at the instance of the Indian Government in 1892. The principal railways, which are marked, are important in connexion with the question of transport.

Assam.—The mines in the Dufla, Khasi, and Jaintia Hills. the latter including the Cherrapunji mines, the Garo and Naga Hills, and the district of Lakhimpur, in which the extensive mines of Makum occur, are of considerable importance in relation to the railway extension in this Province. The thick seams of the Makum mines are being actively worked, and are estimated to furnish 18,000,000 tons. In 1895 the production amounted to 172,717 tons, in 1896 to 177,259 tons. In these mines the boring is usually made horizontally into the hillside instead of by a vertical shaft.

Baluchistan.—This province produced 23,259 tons of coal in 1895, but only 10,572 tons in 1896, the chief mines being those of Khost and Quetta. Much of the coal is too friable to be of general use.

Bengal.—In 1895 there were 218 collieries at work, producing 2,716,155 tons; in 1896, 154 collieries were worked, producing 3,037,920 tons, valued at Rs. 81,46,411. The principal fields are:—*Karharbari* (200 miles from Calcutta), covering 8 square miles and estimated to contain 136 million tons; *Raniganj-Barakar* (about 130 miles from Calcutta), covering at least 500 square miles, and representing 14,000 million tons; *Jheria*, a few miles to the west of Raniganj, covering 200 square miles, and representing 465 million tons; *Bokaro*, close to the Jheria field, which covers 220 square miles in thick seams estimated to contain 1,500 million tons; *North Karanpura*, which occupies 472 square miles, representing 8,750 million tons; *South Karanpura*, which represents about 75 million tons; *Daltonganj*, covering 200 square miles, and representing about 11 million tons; *Ramgarh*, a small field, south of Bokaro, occupying 40 square miles and representing about 5 million tons. Other fields, at present not largely drawn upon, are *Talchir*, *Rajmahal*, and *Darjeeling*, where there is a narrow field of graphitic coal.

Burma.—The most important fields are the *Thingadaw* on the Irrawaddy, and those on the banks of the Chindwin river near Kalewa. The output of coal in Burma amounted to 17,289 tons in 1895, and to 22,993 tons in 1896.

Central India.—In 1895 Central India produced 98,219 tons of coal; in 1896, 115,386 tons. The most important field, and the only one systematically worked, is that of *Umaria* in Rewah, which is only 34 miles from the Katni station on the East Indian Railway and is therefore of great importance as a source of supply for the North-West Provinces and the Punjab. The Umaria field covers three square miles, and is computed to contain 28 million tons of coal. Other fields are those of *Sohagpur*, close to Umaria, covering 1,600 square miles; *Korar*, 9 square miles; and *Bisrampur*, 400 square miles.

Central Provinces.—In 1895 the Central Provinces produced 122,776 tons of coal, but in previous years the amount was far greater. In 1896 it rose again to 141,185 tons. The principal mines are those of *Mohpani*, on the Great Indian Peninsular Railway, about 80 miles to the south-west of Jabalpur, and *Warora;* the latter, which belongs to the Government, is responsible for the increased production of 1896. Other mines are those of *Shahpur* and *Pench*, *Korba*, *Mand*, and *Rangarh;* the three latter, which are in the Mahanadi valley, cover over 1,000 square miles and include several seams of great thickness.

Hyderabad.—The most important mine in Southern India is the *Singareni*, in the Dominion of the Nizam. The output in 1895 was 292,915 tons, in 1896, 262,681 tons; most of it went to Madras and Bombay. The Singareni coal is of especial interest as being at present the nearest to the large deposits of iron ore of the Salem district, some of which is of excellent quality (*see* Annual Report of the Indian Committee of the Imperial Institute, India Office, 1897). Little is at present known of the large coal-fields of *Kamarum*, *Cherla*, *Chinnur*, *Madavaram*, and *Beddadanol*.

Madras.—The principal mines are the *Rajahzompalli* of the *Godaveri* coal-fields, but they are scarcely yet in full working order. It seems probable, from the occurrence of both coal and iron ore in Madras, that before long an important iron smelting industry will be established in this Province.

Punjab.—The *Dandot* mines of the Jhelam district contain three seams about three feet thick. In 1895 they produced 72,493 tons, which were chiefly consumed on the North-Western Indian Railway; in 1896 the production had risen to 79,017 tons. Other fields are those of *Pidh*, *Bhaganwalla*, *Chitapahar*, *Hazara*, and *Bannu*, which, however, have not been fully explored.

Mode of Working; Labour.

For detailed information as to coal mining, coal companies, coal legislation, and coal labour, reference must be made to the "Imperial Institute Handbook on Indian Coal." The following accounts of mining in Bengal may be included here as indicative of the mode and conditions of Indian labour.

"The system of working varies very much. At Warora, Central Provinces, where 100,000 tons per annum are wound by direct acting engines out of two shafts 200 feet deep, the system nearly approaches the English. No women work underground, and work is constant from Monday morning to Saturday night. The work time is divided into three shifts of eight hours each. The seams, which vary from 8 to 12 feet, are worked thus:—Galleries or boards and headways are driven 12 feet wide, and 6 feet in height, leaving the roof coal and pillars 40 feet square. The coal is so hard that it has to be nicked and undercut, and then blasted down. The pillars are worked by splitting each from one headway or another, and then taking the far end off in slice. The roof coal comes with it.

"At the Mohpani collieries a similar system is worked. The difficulties met with in these mines, owing to the faulted and disturbed nature of strata, are probably unequalled in India.

"The Karharbari coal-field is mainly worked by three companies, the Raniganj Coal Association, the Bengal Coal Company, and the East Indian Railway. The system here is similar to that obtaining all over Bengal. The working hours are from 6 a.m. to 6 p.m., and, perhaps, later, when extra work is required. Only four days a week real work is done, and the consequence is that collieries must have a far greater number of working places than the same output in England would warrant. All the miner's family work with him, carrying or training his coal. Picks of English pattern and make are now universal, the crowbar and single pick having been ousted. The workings are on the bord and pillar system. Pillars vary from 12 feet to 40 feet square and 40 feet by 60 feet. In the shallow mines and thin seams (7 to 8 feet) the former size obtains; in the thick seams (from 12 to 20 feet) the latter. Pillars are worked in the 8 feet seam in the following manner:—A 4-feet chock is placed between each pillar in the row of pillars

(generally six in number) that are to come out. A chock is also placed in front of each; the pillar is then attacked from the front side. When pillars are taken out, the chocks are withdrawn and the roof falls.

"The remarks on the Raniganj coal-field given below apply in some measure to this field. Of sinking, coal cutting, the miner's love of holiday, lighting of mines, &c., the description in one case is a description in the other. Payments in this coal-field are weekly, on Sunday mornings, the miners resorting from the pay offices to the East Indian Railway bazaar, which was established to attract local labour, and which has done so. The labourers consist of low-class Mussulmans and Hindus, as also aborigines—Santals and Kols. There are some Bauris, brought from Bengal to teach the local men how to cut coal. The local men, however, cut coal better, as they have discarded the Bauri *sabel*. Local labour is more tractable, and the Bauris are not in such requisition as formerly.

"Drainage is effectively carried out by Tangye's special and lifting and forcing pumps, worked by bob-levers from horizontal engines. The machinery is of good type, and winding and hauling are done by good engines, Ventilation is attended to in the deep mines, mainly by furnaces or steam-jets.

"The miners live in small villages, aggregations of huts of mud walls of bricks set in mud with thatched or tiled roof. The hut consists of one room, sometimes two, of from 6 feet by 6 feet to 10 feet by 10 feet in size. Those better off have cow-sheds and granaries; these two latter with the dwelling forming three sides of a quadrangle. The larger proportion of the labourers cultivate during the rainy season, and work at the collieries only in the cold season, say from October to June. Some of the labourers have settled down to coal cutting as a calling, and these work constantly, always excepting Monday, which is invariably a holiday.

"Coal cutting is paid for by contract at so much a tram or bucket. These are of various sizes. The price generally amounts to from 7 to 8 annas per ton for large, and $1\frac{1}{2}$ to $1\frac{3}{4}$ annas per ton for small coal. All other work as stone-cutting, sinking, rail-laying, &c., is paid for by daily wages.

"The coal is hand-picked into four kinds. Steam is larger than 2-inch cube, rubble larger than $\frac{3}{4}$ inch cube, smithy down to $\frac{1}{4}$-inch cube, and all smaller than that is called slack or dust. This picking or screening is done by contract, and for rubble and smithy the coolies get about 4 annas per ton. Slack is not paid for. Loading is done by hand into the railway waggons. At the mines tipplers are used for discharging the coal from underground trams into the waggons that run in the narrow-gauge tramways."

The following notes on the Raniganj coalfield are by Mr. T. H. Ward:—

"The Chord line, East Indian Railway, passes across this coalfield, and the collieries are clustered on either side and along the Barakar branch, sidings and branches, up to six miles in length, built by private enterprise, connect most of the collieries to the main line. Here winding engines, wire-rope guides, and tipplers, and the regular paraphernalia of an English colliery are fast supplanting the primitive 'gin' and bucket of a few years ago. These gins were (and sometimes are still) turned by women, 25 to 30 being employed on each gin. They kept time to a monotonous chant which they sang as they tramped round and round. The sinking in the district is easy, through soft sandstones, no brickwork being required to protect the sides. Heavy water is sometimes met with.

"The coal in the east of the field is very strong and non-caking. The sandstone roof is also very strong, and comes right down into the coal. Practically no timber is required in working the coal in the manner described below. In the west of the field, at Sanctoria for instance, the coal is not so strong, though the roof is everywhere the same. From Belrooi near Sitarampore, westwards, the seams worked are all coking coals.

"The seams worked are seldom less than 10 feet, and sometimes reach 11 feet, in thickness. In the Barakar Coal Company's Kumardubhi Colliery and the Bengal Coal Company's Liakdee Colliery on the west of the Barakar, the enormous thickness of upwards of 80 feet has been found.

"The mine is laid out underground on the same plan throughout the district. This plan has been stereotyped all over the field, and is adopted without reference to its suitability to the different conditions obtaining in the

various seams worked. Indeed, it has been adopted apparently more with reference to the prejudices of the native miner than from economical considerations. Galleries are excavated to the full height of the seam 12 feet to 16 feet wide, leaving square pillars of varying sizes to support the roof, many acres being thus often left on pillars. The native cooly insists (and he has his own way very much in this coalfield) on commencing operations at the roof, and working downwards until the full height of the seam has been excavated. His chief and dearly-prized weapon is a 'sabal' or crowbar with a sharp point at one end. With this he smashes the coal, standing always when at work. He never groves beyond the first 'cleat.' Gangs of four or five men occupy each gallery. They are paid by the bucket or tram of steam coal or small delivered at the pit bottom. If any timber has to be set up in a working place, a man of the carpenter caste (Chutar), who is paid a daily wage, must be sent for the purpose.

"Women and children work underground, and are principally employed in carrying the small coal and dust. They are also paid by the tram or bucket. The women often take their babies, two and three months old, down the mine, taking with them also a small cot on which the child sleeps or plays while its parents are at work.

"Access to the mines is very generally by inclines opening to the surface.

"In the eastern part of the district the seams are for the most part flat; in the central and western parts the strata are often steep (the general dip being southerly), and intrusions (dykes) of trap rock become more frequent. The deepest shafts are about 250 feet, the largest part of the coal yet won being from much less depths. Some fire-damp has been met with in the western part of the district. Chanch Colliery (west of the Barakar), belonging to the Bengal Coal Company, was abandoned some years ago, after an explosion in which several men were burnt, some of whom died. At Sanctoria, also belonging to the Bengal Coal Company, some men were burnt in 1883.

"The collieries of Kumardubhi and Liakdee have already been mentioned. Thousands of tons of coal have been won from the outcrops merely of these magnificent seams, and thousands of tons still remain to be worked without indenting on their resources at any greater depth.

"The 'Bauri' is the principal caste which supplies coal-cutters for the district. In some respects the Bauri colliers' characteristics are amusing, like those of his western prototype. He is very fond of getting drunk, especially at the week ends, and very disinclined to go to work on Mondays. He is good-tempered and improvident; it is a difficult matter to persuade him, although he is always paid a 'ticca' (contract) rate for his work and could easily increase his earnings, to do more than will, with his wife's contributions, keep the household in rice and himself in drink for the day. The nearly universal and very bad custom in this district is to pay each evening for the work done during the day. The collier or cooly has often to wait about until 8 or 9 p.m. for his money. He then goes cheerfully home, and remains up half the night drinking and singing with his companions (he is very social in his habits), incomprehensibly happy with his tuneless tom-tom. In the morning he trudges back, very often seven or eight miles (a distance of course travelled twice a day) to work, and is down the pit at 9 or 10 a.m. All day, in the intervals of work, he sucks the comforting hubble-bubble.

"The light which the collier carries with him is exceedingly primitive. He gets an allowance of oil in proportion to the number of trams of coal he cuts. Every morning he draws at the go-down sufficient for his requirements during the day, with an allowance of cotton thread or old rags to serve for wick. This oil he burns in a 'chiragh,' or small piece of stone hollowed out into the shape of a boat (a piece of tile from the roof of his house is often substituted). In this he places a small quantity of oil and a portion of wick. Any oil he can save from his allowance is his perquisite, and he can carry it home. Mohawa and castor oil are the chief oils used. Some of the mines are lighted by kerosene, burnt in small tin lamps holding about two ounces, with small circular wicks. The native does not like this plan so well, as he cannot use it to rub on his body or to season his food, a purpose for which mohawa oil is used.

"The ventilation of the underground workings receives very little attention, and in most collieries none at all. The great freedom from fire-damp, and the lofty seams exploited, have kept this question in the background. The ignorant native has not yet realised that his health and longevity are in question, and he has, besides, helped much to prevent ventilation becoming a necessity, by the wonderful power of endurance he has shown, and which enables him to work for hours at the bottom of a sinking shaft with water pouring over his naked body, or to work all day long, or day after day, in driving a 'rise' gallery, perhaps hundreds of feet from any current, in an atmosphere which is fetid and laden with steam. This is a blot on the mining of the district, and ought to be speedily removed."

Production.

The increase in recent years of coal production in India is very remarkable. In 1895 it amounted to no less than 3,537,820 tons, valued at Rs. 1,28,81,352. This is nearly half as much again as that for 1894, and an increase of more than 50 per cent. as compared with the average for the three previous years. In 1896 the quantity was greater still, 3,848,013 tons. These figures would seem to be a trustworthy indication of an increase in the general commercial and industrial prosperity of India, since the amount consumed for domestic purposes is inappreciable, nearly the entire quantity being consumed in steamships, railways, and factories. The average price of Bengal coal is Rs. 2 per ton at the pit's mouth. Picked coal sells at from Rs. 3 to Rs. 4 a ton.

The output for 1896 of the principal collieries is given in a table appended to this Report. (Table I.)

Imports and Exports.

The imports of coal from foreign countries into India in 1894–95 amounted to 808,713 tons, more than three-fourths of which were taken by Bombay. In 1895–6 the imports fell to 746,850 tons. Nearly the whole of the foreign coal is derived from the United Kingdom; Australia, and, in a smaller degree, Japan, are among the countries whose export of coal to India show a considerable advance, although together their output is less than one-twentieth of that of the United Kingdom. The statistics of the last few years show that India is relying more and more on her own fields as a source of supply, the increase in the amount of coal imported being small as compared with the enormous advance in the amount produced internally. It may be safely concluded that the complete cessation of foreign imports of coal is only a matter of time.

With regard to the export of coal from India; in 1895 53,565 tons, representing a value of Rs. 500,226, left the country; in 1896 the exports reached 79,989 tons. Nearly the whole of this went to Ceylon, not for internal use, but to meet the large demand for steam traffic at Colombo. Ceylon now obtains from India what she formerly took from Europe, and chiefly from the United Kingdom. It is stated that complaints have been recently made that Bengal coal is too "dirty" to be suitable for use by the Ceylon railways. This is a difficulty which ought to be easily overcome, for there is plenty of suitable locomotive coal in Bengal.

Chemical Examination.

The chemical examination of the various samples of Indian coal has been confined, in the first instance, to those points which are of importance in determining the general quality of each coal, and in indicating the particular purposes for which it is suitable. In certain cases these data have been supplemented by ultimate analysis (combustion) for the determination of carbon and hydrogen. The constituents which have been determined are: *fixed carbon*, perhaps the most significant datum not only in reference to the value of the coal as such, but also as affecting the quality of the coke (*i.e.*, fixed carbon and ash) obtainable from it; *ash*, or mineral matter, a high percentage of which is characteristic of an inferior coal; *volatile matter*, including bituminous constituents, gas and water; *sulphur*, a large proportion

of which is objectionable for most of the purposes for which coal is employed, and especially for the smelting of iron.

In addition to the foregoing constituents, an approximate determination has been made of the heat-producing power of the principal coals by ascertaining the *thermal value* or *calorific equivalent.* The general characters and caking quality of each coal have also been recorded.

Methods of Examination.

For purposes of reference the following particulars of the methods employed are given :—

Sampling.—Pieces of several pounds weight were sawn from the large blocks, weighing from ½—1 cwt. in most cases, which formed the specimens, and these were completely broken up and averaged. The specimens generally, as received, were stated to be fairly representative of the seams from which they were taken.

Technical Analysis.—The percentages of fixed carbon, volatile matter, sulphur and ash were determined under the following conditions :—

About 0·2 gram of the finely-powdered coal was weighed out into a tared platinum crucible; the latter was supported 12 inches above the working bench, and heated over a No. 8 Fletcher-Bunsen burner, working at full power for two minutes; it was then immediately subjected to a blow-pipe flame for two minutes longer, being kept at a bright red heat. After cooling in a desiccator, it was weighed, and the loss reckoned as volatile matter, which, of course, included moisture. The well-fitting lid of the crucible was not removed during the whole of this process. In the case of caking coals, a very small quantity of soot sometimes remained on the under side of the lid, and escaped combustion. These determinations were made in duplicate, and passed if the difference was not more than 0·3 to 0·4 per cent. at this stage. The crucible was then put into a muffle furnace with the lid half off, and heated until nothing but ash remained, when it was cooled in the desiccator, and weighed. The loss was reckoned as fixed carbon, and the residue as ash; the colour of the ash will be found recorded in the tables.

For the estimation of the sulphur about 1·5 grams of coal were fused in a platinum dish, with 30 grams of the following fusion-mixture:—Sodium-chloride, 4 parts; potassium nitrate, 3 parts; sodium carbonate (dry), 1 part. The mixture was slowly heated, and, after a short time, it deflagrated and became liquid; when cool, it solidified into a white cake, which was dissolved in boiling water; the solution was filtered, acidified with hydrochloric acid, and, while quite hot, precipitated with barium chloride. By keeping the beaker and its contents warm on the water bath for three or four hours, the precipitate of barium sulphate was obtained in a granular form very suitable for filtering. Most of the filtering was done through a felt of asbestos placed in the bottom of a perforated platinum crucible, with the help of a water pump, this being a modification of Gooch's method. Careful test-experiments showed that, in point of accuracy, this method was at least equal to that ordinarily used, viz., igniting the precipitate of barium sulphate in a crucible; it is for speed much to be preferred. These estimations were made in duplicate, a difference of 0·3 per cent. being considered quite allowable after considerable experience. In some cases the sulphur left in the coke was estimated.

Ultimate Analysis.—This was conducted on selected coals, in the usual manner. The coals were first dried in a current of hydrogen gas at 120° C. for half an hour; this was done by pushing the platinum boat containing the weighed quantity of coal into the centre of a long piece of wide glass tubing, which itself was passed through the walls of a saucepan. Hydrogen was led in at one end and allowed to diffuse through a small piece of fine tubing packed with cotton wool, inserted in a cork at the other end. A burner was lighted under the saucepan, and a thermometer fixed into a hole in the lid; a very convenient air-bath was thus obtained. The coal, after being dried, was then burned in the usual way in a piece of hard glass tubing. The tube used was filled to a length of 15 inches with copper oxide (from wire), and to the

extent of 4½ inches with lead chromate, these materials being kept in position by plugs of fine copper gauze. The total length of the tube was about 34 inches. It will be noticed that the amount of ash, as determined in the combustion, was, in some cases, distinctly higher than when estimated by the technical method. This is doubtless due to the presence of iron and other mineral substances in the ash, which are left in a higher state of oxidation after being heated in oxygen.

The Calorific Equivalent has been determined by means of Thompson's calorimeter, the apparatus being previously standardised by the combustion of material of known calorific value, and the necessary correction applied to the experimental numbers. The results are stated in large calories.

The services rendered in connexion with the experimental work by Dr. F. Lühn, Special Assistant Chemist in the Scientific Department, and by Mr. A. M. Crighton, Junior Assistant Chemist, merit official record.

Results.

The results obtained in this examination are given in the tables appended to this Report, the various samples of coal being arranged under the Provinces from which they were obtained (Table II.). For convenience of comparison, and also to render possible a general survey of the figures, they have been plotted in curves on the diagram which is appended. A table of previous analyses of Indian coals is also given, to which is added, for comparison, analyses of typical British coals (Table III.). To those familiar with the technical valuation of coal, the data need little explanation or comment. It will be seen at once that Indian coal varies much in composition and quality. Most of it is quite suitable for ordinary purposes, whilst some of the samples, *e.g.*, certain of those from Bengal and Central India, are of excellent quality, equal to that of some of the best British coals. It may be useful to draw attention to the characteristics of the coal of each district.

Assam.—The coal from *Makum* is regarded as one of the best of the Indian steam coals, though this is scarcely borne out by the two samples now reported on. The ash is remarkably small, but the sulphur is high. Neither of the two samples examined contained the very high percentage of fixed carbon (75·7 per cent.) recorded by Mr. F. R. Mallet in his Memorandum on the Coal-fields of Assam (1876), (*see* Table III.). One of the samples gave a rather soft coke containing much sulphur; the other was non-caking.

The sample from *Cherrapunji,* though low in ash, contains much sulphur; it is, however, a hard caking coal, burning like cannel. The sample examined differs considerably from that reported on by Mr. James Prinsep (*see* Table III.). An account of the Cherrapunji field has been given by Mr. T. De la Touche (Records of the Geological Survey of India, Vol. 22, Part 3, 1884). The sample from *Maoflong* is similar to the other Assam coals, but differs very much from the two samples analysed by Mr. F. R. Mallet (*see* Table III., Records, Geological Survey of India, Vol. 8, 1875). The sample from the *Dikhu* Valley is a non-caking bituminous coal.

All the Assam coals are remarkable in being comparatively free from mineral constituents (ash). They are probably serviceable as steam coals, but the samples examined contain too much sulphur for use in iron-smelting.

Baluchistan.—The *Khost* coal is tertiary and somewhat bituminous. Of the two samples from the Khost colliery, that from the Khost seam is probably a serviceable caking steam coal, containing, however, a large proportion of sulphur. That from the *Killa-Hakim* seam contains little sulphur, and has the characters of a fair caking coal which furnishes more heat when burnt than would be anticipated from the analytical numbers.

Bengal.—The coal in Bengal varies greatly in quality; much of it is excellent, the fixed carbon ranging between 50 and 60 per cent., and the

calorific value exceeding 6,000 cals. (= about 10 British thermal units), whilst the ash often does not much exceed, and in some instances falls below, 10 per cent., and the sulphur is frequently present in but very small proportion. A great deal of the Bengal coal is serviceable steam coal. Many samples cake well and contain little sulphur, and the coke is therefore suitable for iron smelting.

The 53 samples of Bengal coal were derived from the following collieries :—

Raniganj.	Sanctoria.
Barakar.	Searsole.
Kumardubhi.	Jemehiri.
Rajpur.	Madhubpur.
Loyabad.	Daltonganj.
Petana.	Buggutdeah in Jheria.
Karharbari (Giridih).	Barmondia.
Sodepore.	Luchipur.
Liakdee.	Ghoosick.
Nimcha.	Baratchak.
Kooldeah.	Chattabad.
Jeyramdangah.	Moulkara.
Dhadka.	Nandi.
Belrooi.	Kalipahari.
Borrea.	Kustore.
Salanpur.	Patlabari.

The analyses of *Karharbari* coal agree well with those published by Dr. Saise (Table III.). From this coal a considerable quantity of coke is produced, at present chiefly in the Anchor rectangular oven, partly for locomotive service and partly for use in the East Indian Railway Company's foundry at Jamalpur.

The *Barakar* coal has the reputation of being a first-rate steam coal, and a certain quantity of coke containing very little sulphur is produced from it. *Sanctoria* coal is considered to be a good gas coal, so also is the *Giridih* coal, which is used by the Calcutta Gas Company.

Burmah.—Only two samples have been received from the Burmah Coal Company. The origin of the coal is not stated, but it is probably derived from the *Shwebo* district, about 60 miles above Mandalay and four or five miles from the Irrawaddy. That from the roof of the seam is an inferior non-caking coal difficult to burn, so that its calorific equivalent could not be ascertained. That from the floor of the seam is valueless, being nearly incombustible and little better than shale.

Central India.—The *Umaria* Government Colliery, in the *Rewah* district, from which all the samples came, produces coal of various qualities. None of it is first-rate, or equal to the Bengal coal, the ash being high and the fixed carbon and the calorific equivalent small. The sulphur, however, is not excessive, and the picked coal may be serviceable for locomotive use and for some other purposes. It does not cake, and therefore cannot furnish coke. None of the present samples are equal to that analysed by the Geological Survey in 1884 (Table III.).

Central Provinces.—Four samples were received from the Nerbudda Company, *Mohpani*, six from *Warora*, and three from the *Mohpani* Mines. The Mohpani samples, sent by the Nerbudda Coal and Iron Company, are non-caking coals of fair quality, the sulphur is small, but in two samples the ash is high. They are inferior to the sample of which an analysis is on record (Table III.).

The samples sent from the Government Colliery of Warora are all non-caking coals resembling those from Mohpani; the fixed carbon is, however, usually lower and the sulphur higher. There is said to be excellent iron-ore and lime-stone in the Warora district, which might be worked if a caking coal could be found. At present nearly the whole of the output of the colliery is employed on the Great Indian Peninsula Railway, with which the colliery is connected by a branch railway joining the main line at Wardah Junction, about 50 miles distant.

The second consignment of Mohpani coal is somewhat similar in its proportion of fixed carbon. In two samples the ash is high, but the sulphur low. This coal differs from that of Mohpani (Nerbudda) and Warora in caking well. The Mohpani mines are close to the Gadawarra station on the Great Indian Peninsula Railway, about 80 miles from Jabalpur.

Nizam's Dominions.—The two samples of coal from *Hyderabad* (Singareni) are of fair quality as steam coals. One does not cake, and the other only slightly. In one the sulphur is low, in the other rather high, and the same remark applies to the ash.

Madras.—No samples were received from this Province.

Punjab.—The samples were obtained from *Dandot, Pidh, Baghanwalla,* and *Shahrig.* The Dandot sample is a good non-caking steam coal, with a relatively high calorific value, though low in fixed carbon. The Pidh is a similar but rather better non-caking steam coal, with a somewhat high proportion of sulphur. The Baghanwalla is an inferior coal which cakes slightly. The coal from the Takrai seam of the Shahrig district is a bituminous caking coal, with a low percentage of fixed carbon but a relative high calorific value, depending on the presence of solid hydrocarbons. It is probably a serviceable but fast burning coal. One sample of shale from Pidh and another from Dandot were examined for mineral oil and gas. In both cases the result was unsatisfactory, neither specimen furnished any appreciable quantity of oil, whilst the Pidh shale produced rather more than one-half and the Dandot shale less than one-fourth of the quantity of gas obtained from good English coal, and the gas was of poor illuminating power.

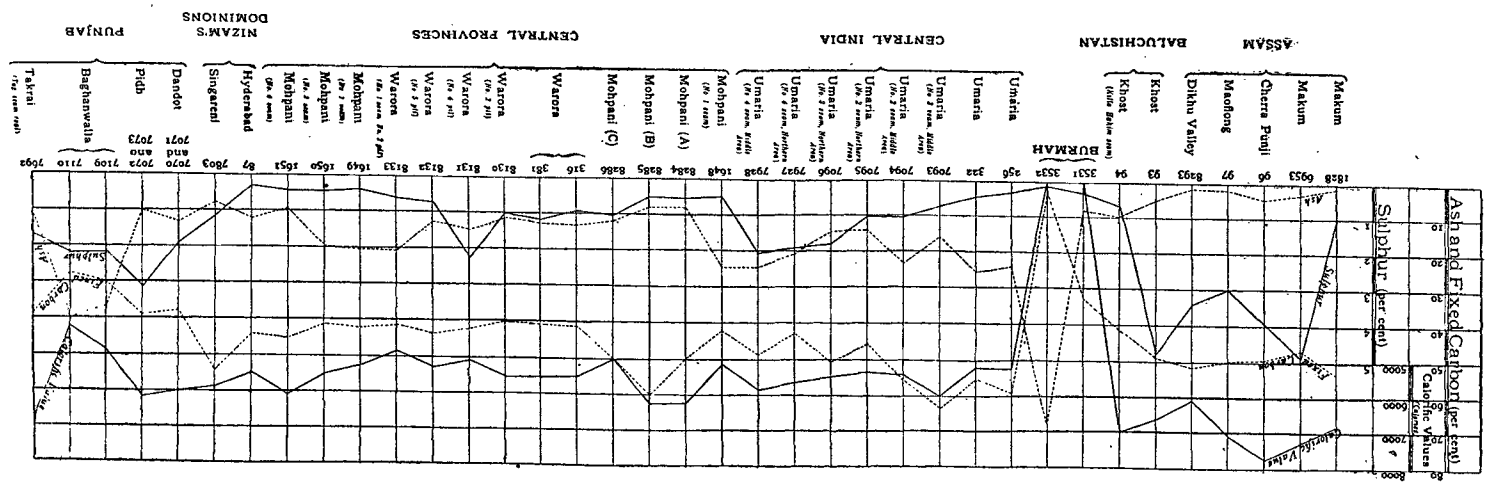
The information contained in this report as to the coal deposits of India, together with the results of the analyses of samples taken from some of the principal seams, will, it is hoped, be the means of directing attention to the possibilities of industrial enterprise which India offers through her enormous coal supply.

Samples of the coal referred to in this Report, and in some cases of the cokes furnished by them, may be seen in the Indian Collections of the Imperial Institute.

WYNDHAM R. DUNSTAN,

25th March 1898.

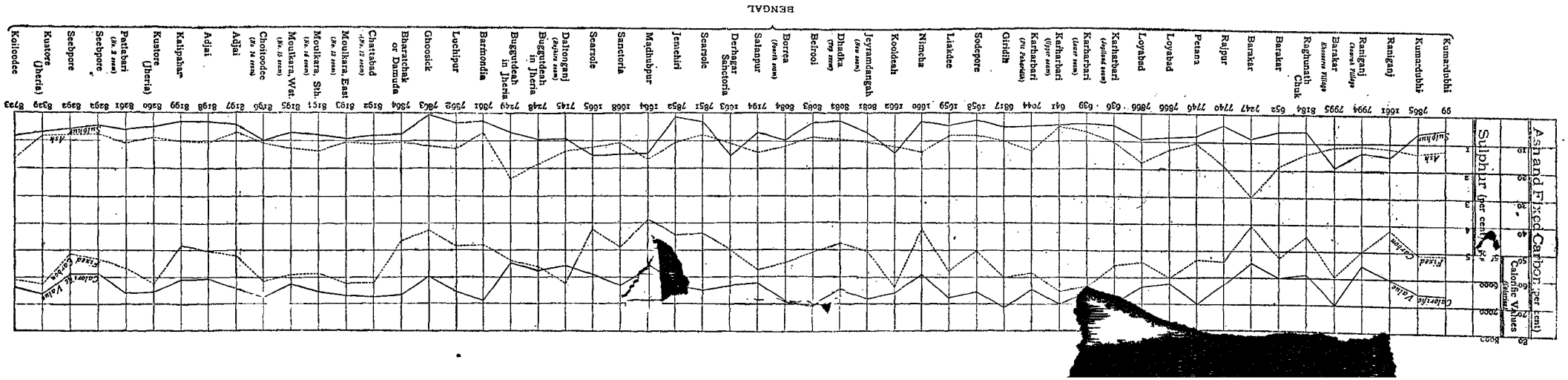
Diagram (No. 1) showing the Composition and Calorific Values. Illustrating Professor Dunstan's Report, *see* Table, pp. 92–99.



Examination of Indian Coals.

Diagram (No. 2) showing the Composition and Calorific Values.

Illustrating Professor Dunstan's Report, *see* Table, pp. 92–99.



INDIA
SHEWING
RAILWAYS & COAL-FIELDS
(To accompany Professor Dunstan's Report on Indian Coal Supply, 1898).
Scale 1 Inch = 60 Miles or 100 Kms.
INDIAN COAL-FIELDS.
ASSAM
1 Margum ... Collieries
2 Dehangiri ... Prospective
Cherrapunji ... Worked.
3 Lakadong ... Prospective.
Mawsiluru (Maomlakrah) ... Worked.
4 Dihing / Jaipur / Nadua ... Prospective.
BALUCHISTAN.
5 Khost ... Colliery.
6 Mach ... Prospective.
7 Quetta ... Worked.
BENGAL.
8 Ramgarh & Baraker ... Collieries.
9 Kasharbari (Ghoosick) ... Collieries.
10 Rajmahal ... 8 Fields, Stile worked
11 Jaipuria ... Prospective.
12 Boiard / Ramgarh / Karharbari, N. & S. ... Prospective.
13 Auranga ... Worked.
14 Hutar ... Worked.
15 Daltonganj or ... Worked.
16 Eon R., (Karwa) ... Prospective.
17 Talchir ... Prospective.
18 Darjeeling, Tista R. ... Prospective.
BURMA.
19 Thingkwin ... Working.
20 Chindwin ... Prospective.
21 Langri ... Very Poor.
22 Thayetmyo / Henzada ... Very Poor.
23 Mergui ...
CENTRAL INDIA.
24 Umaria ... Colliery
25 Sohagpur, &c. ... Prospective.
26 Singrowli / Bisrampur, &c. ...
CENTRAL PROVINCES.
27 Mohpani ... Colliery
28 Wardha (Chanda, &c.) ... Colliery.
29 Sharpur / Pench ... Prospective.
30 Kohra / Mand / Raigarh-Hingir
NIZAM'S DOMINIONS AND MADRAS (GODAVARI VALLEY).
31 Singareni ... Colliery
32 Kamthi / Cheyla / Rajahmundry ... Prospective.
33 Chintalapalli ... Colliery.
34 Chokmun / Madivaram / Bhadrachalam ... Prospective.
KASHMIR.
35 Kashmir Mines ... Prospective.
PUNJAB.
36 Dandot ... Colliery.
37 Chua Pahar / Hazara / Bawnu ... Poor.
N.B.—Many unimportant Coal Tracts are omitted. The tracts represented on this Map are Coal areas, but in many cases, as in the Godavari Valley, the intermediate blank spaces are occupied by the barren Sandstones of the Lower Gondwana Formation, under which Coal-measures are known to lie.
Prospective fields are such as may be developed within the next decade; those fields without symbols are either local or in play, or are at present buried by vast accumulations.
This Map was originally issued with the "Imperial Institute Hand-book on Indian Coal" (1898). Recent important railway extension has been included.
WYNDHAM R. DUNSTAN,
March, 1900.
REFERENCES.
Railway Gauge, open, double line
Railway Gauge, open, single line
Railways sanctioned or under construction
Metre Gauge, open
Railways sanctioned or under construction
Other gauges, open
Railways sanctioned or under construction
Junctions between two or more Foreign lines
Junctions on home lines
ARABIAN SEA
BAY OF BENGAL
BALUCHISTAN
RAJPUTANA
CENTRAL INDIA
CENTRAL PROVINCES
BERAR
BOMBAY
MADRAS
CEYLON
ANDAMAN ISLANDS
NICOBAR ISLANDS
LACCADIVE ISLANDS
MALACCA STRAITS
Eight Degrees Channel
Ten Degrees Channel
Coco Channel
Preparis Passage
Duncan Passage
Six Degrees Channel
Great Andaman
Little Andaman
Car Nicobar
Chowra
Teressa
Katchall
Nancowry
Trincut
Camorta
Menchal
Kamorta
Nankauri
Pulo Way
Pulo Penang
Pulo Brasse
Pulo Jerajah
Pulo Nias
Pulo Weh
Pulo Rondo
Pulo Berouch
Pulo Pisang
Pulo Aor
Pulo Jamboo
Pulo Tingy
Pulo Pemanggil
Pulo Aroa
Pulo Tioman
Pulo Aor
Pulo Sambilan
Pulo Tinggi
Pulo Babi
Pulo Kapas
Pulo Kemaman
Pulo Redang
Pulo Perhentian
Pulo Kapas
Pulo Lang Tengah
Pulo Tenggol
Pulo Bidong
Pulo Kra
Pulo Ta Pao
Pulo Ta Mieu
Pulo Obi
Pulo Panjang
Pulo Rondo
Pulo Berouch
Pulo Pisang
Pulo Aor
Pulo Jamboo
Pulo Tingy
Pulo Pemanggil
Pulo Aroa
Pulo Tioman
Pulo Aor
Pulo Sambilan
Pulo Tinggi
Pulo Babi
Pulo Kapas
Pulo Kemaman
Pulo Redang
Pulo Perhentian
Pulo Kapas
Pulo Lang Tengah
Pulo Tenggol
Pulo Bidong
Pulo Kra
Pulo Ta Pao
Pulo Ta Mieu
Pulo Obi
Pulo Panjang

APPENDICES.

TABLE I.

Output of Indian Collieries in 1896.

Provinces and Districts.	Name of Mine.	When opened.	By whom worked.	Output of coal in 1896.
				Tons.
Assam :—				
Lakhimpur (Makum mines).	Tekak - - -	1882	Joint Stock Company -	177,259
	Ledo Valley - - -			
	Upper Ledo - -			
Naga Hills - - -	Dikhu Valley - - -	—	Assam Tea Company -	92
	Total for Assam - - - - - -			177,351
Baluchistan - -	Khost - - - - -	1887	North-Western Railway.	
	Shahrig - - - -	—		
	Sor Range (Quetta) Coal Mines.	—	Private.	
	Total for Baluchistan - - - - -			10,572
Bengal :—				
Burdwan - - -	Total production of Burdwan District Collieries - - - -			1,782,937
Bankura - -	Total production of Bankura District Collieries - - -			14,972
Hazáribágh - -	Total production of Hazáribágh District Collieries - - -			666,919
Manbhoom - -	Total production of Manbhoom District Collieries - - -			571,356
Sonthal Pergunas -	Total production of Sonthal Pergunas District Collieries - -			1,640
Darjeeling - -	Total production of Darjeeling Collieries - - - -			96
	Total production of Bengal Collieries - - - -			3,037,920
Burma :—				
Shwebo - - -	Letkakpines (Thingadaw) -	—		
Thayetmyo - -	Tondaung - - -	—		
	Total production of Burma Collieries - - -			22,993
Central India :—				
Rewah - - -	Umaria - - - - -	1884	Government - - -	115,386
	Total for Central India - - - -			115,386
Central Provinces :—				
Narsingpur - -	Mohpani - - -	1863	Joint Stock Company -	19,542
Chanda - - -	Warora - - - - -	1871	Government - - -	121,643
	Total production of Central Provinces Collieries -			141,185
Nizam's Dominions -	Singareni - - -	1887	Joint Stock Company - -	262,681
Madras - - -	Rajahzompalli - - -	—	Godavari Coal Company, Ltd.	1,737*
Punjab :—				
Jhelum - - -	Dandot - - -	1886	North-Western Railway -	79,017
	Pidh - - - -	—		
	Baghanwalla - -	—	Do. do. -	6,137*

* 1895.

TABLE

Tabulated Results of

Indian Invoice Number.	Imperial Institute Number.	Date.	Mine.	Whence received.	Remarks made in forwarding Sample.
			ASSAM.		
*1828	3032	4 Oct. 1894	Makum	Assam Railways and Trading Company (Ledo Valley).	——
6953	7082	11 Jan. 1896	Do.	Assam Railways and Trading Company, Limited.	2 cwts. Makum coal
*96	1445	4 Oct. 1894	Cherra Punji	Cherra Punji Coalfield	——
*97	1446	Do.	Maoflong	Maoflong Coalfield	——
8293	7778	25 Nov. 1896	Dickhu Valley	Dickhu Valley Colliery, Nazira, Assam.	——
			BALUCHISTAN.		
*93	1441	4 Oct. 1894	Khost Colliery	Khost Colliery, Khost seam	——
*94	1442	Do.	Do.	Khost Colliery, Killa Hakim seam.	——
			BENGAL.		
*99	1448	Do.	Kumardubhi	Barakar Coal Company, Kumardubhi Colliery.	——
7865	7311	13 July 1896	Do.	Barakar Coal Company	One box of steam coal from Kumardubhi Colliery.
*1661	2865	4 Oct. 1894	Raniganj	Bengal Coal Company, Limited, Raniganj coal.	——
7994	7454	29 July 1896	Do.	A. Whyte, Esq., Raniganj	Coal from the village of Chowrah, 4 miles east of Toposi Railway Station on the East Indian Railway, and belonging to the Raniganj series.
7995	7455	Do.	Do.	Do. do.	Coal from the village Khooseree belonging to Pandra Estates, situated 8 miles N.-W. of Barakar and belongs to the Lower Barakar series. In this seam a band of 2 feet very dark and carbonaceous clay divides the seam into two, the top coal is 5 ft. 6 in. in thickness, of bright appearance, the bottom coal is 6 ft. 6 in. in thickness and is a heavier and duller looking coal.
8184	7758	25 Nov. 1896	Raghunath Chuk.	Jaganath Coal Company, Raniganj.	Raghunath Chuk coal
*652	1996	14 Oct. 1894	Barakar	Barakar Iron Works	——
7247	7099	28 Mar. 1896	Do.	New Barakar Coal Company, through G. Alexander, Esq.	Coal taken from an incline just being opened out, situated three miles from Barakar on the Jheria Branch Railway. Taken from about 10 feet below the surface.
7740	7323	25 June 1896	Rajpur	Manager, Rajpur Coal Company, Barakar.	Coal from Rajpur Colliery, as usually obtained.
7746	7317	26 June 1896	Petana	Messrs. Mylne & Co., Proprietors, Petana Colliery, Barakar.	Petana steam coal

II.

Examination of Indian Coals.

Calorific Value.	Fixed Carbon per Cent.	Ash per Cent.	Coke per Cent.	Volatile Matter per Cent.	Sulphur per Cent.	Caking Properties.	Colour of Ash.	Other Characteristics of the Coal.
6853	53·28	1·02	54·30	45·45	1·07	Does not cake.	Pale chocolate	A glistening black coal, clean to handle, easily broken, conchoidal fracture.
7205	47·84	3·66	51·50	48·50	4·87	Cakes -	Reddish brown	Very dirty and dusty coal, breaks readily with irregular fracture, alternately dull and bright.
7702	49·54	4·74	54·28	45·72	3·98	Do. -	Dark red -	A dark black coal, dirty, very hard, with cuboidal fracture.
7128	49·79	2·96	52·75	47·25	3·08	Do. -	Yellowish brown.	Bright and clean with fossil resin in many places.
6028	51·40	2·35	53·75	46·25	3·45	Does not cake.	Dark reddish brown.	A very bright coal, black as pitch, and of conchoidal fracture; intersected with dull layers, and thin layers of a clayish mass.
6633	49·58	5·15	54·73	45·27	4·82	Cakes -	Terra-cotta -	Clean, bright and hard, but disintegrating with a white efflorescence, and with evolution of sulphuretted hydrogen.
6936	41·50	9·56	51·06	48·94	0·74	Do. -	Yellowish brown.	Clean, bright and hard, with obtuse fracture.
6567	51·48	13·85	65·33	44·67	0 53	Do. -	Grey - -	Layers of dull and bright coal, clean rounded fracture.
6490	51·35	14·95	66·30	33·70	0·63	Do. -	Dove - -	Dull, with bright patches, fairly tough and clean.
6028	42·05	12·35	54·40	45·60	1·58	Do. -	Fawn - -	Bright, hard, and dirty.
5621	49·59	11·15	60·74	39·26	1·47	Does not cake.	Light fawn -	Dull, with bright patches, rather tough, clean.
6930	59·01	11·96	70·97	29·03	1·89	Cakes -	Dirty fawn -	A dull silky coal with bright patches, breaks easily, clean.
5863	45·03	14·97	60·00	40·00	0·64	Does not cake.	Greyish pink -	Alternate layers of bright and dull coal, dirty, breaks easily with much dust.
5962	53·49	18·33	71·82	28·18	0·62	Cakes -	Greyish white	Dull, black, dirty, very hard.
5410	41·80	29·25	71·05	28·95	0·89	Do. -	Dirty white -	Dull black coal with bright patches in places, cleaves occasionally with a silky fracture, clean.
6825	55·05	18·95	74·00	26·00	0·47	Does not cake.	Do. -	A dull coal with bright patches, fairly tough, conchoidal fracture.
6920	54·38	10·44	64·82	35·18	0·82	Cakes -	Do. -	Glistening coal composed of dull and bright portion, former tough, the latter readily broken. Occurs in well-defined layers.

Indian Invoice Number.	Imperial Institute Number.	Date.	Mine.	Whence received.	Remarks made in forwarding Sample.
7866	7312	13 July 1896	Loyabad	Manager, Barakar Coal Company.	Steam coal from Loyabad Colliery.
7866	7312	Do.	Do.	Do. do.	Do. (A special piece which was roughly ovoidal.)
*636	1980	4 Oct. 1894	Karharbari	East Indian Railway, Karharbari Colliery, Jogiland seam.	——
*639	1983	Do.	Do.	East Indian Railway, Karharbari Colliery, Lower seam.	——
*641	1985	Do.	Do.	East Indian Railway, Karharbari Colliery, Upper seam.	——
7044	7081	31 Jan. 1896	Do.	Manager, Giridih Colliery Company, Limited.	(Karharbari Lower Seam) from Pit Paharidih, Giridih Coalfield.
6817	7070	6 Jan. 1896	Giridih	Superintendent, Bengal Coal Company, Limited.	Steam coal, Giridih
*1658	2862	4 Oct. 1894	Sodepore	Bengal Coal Company, Limited.	Sodepore coal
*1659	2863	Do.	Liakdee	Do. do.	Liakdee coal
*1660	2864	Do.	Nimcha	Do. do.	Nimcha coal
*1662	2866	Do.	Kooldeah	Do. do.	Kooldeah coal
8081	7453	11 Aug. 1896	Jeyramdangah	Managing Agent, New Beerbhoom Coal Company.	Coal from Jeyramdangah, new seam.
8082	7448	Do.	Dhadka	Do. do.	Coal from Dhadka, top seam.
8083	7451	Do.	Belrooi	Do. do.	Coal from Belrooi
8084	7452	Do.	Borrea	Do. do.	Coal from Borrea, fourth seam.
7194	7097	20 Mar. 1896	Do.	Managing Agents, Borrea Coal Company.	Salanpur coal
*1663	2867	4 Oct. 1894	Sanctoria	Bengal Coal Company, Limited.	Coal from Derhagar, Sanctoria.
7851	7321	10 July 1896	Searsole	Searsole and Jemehiri Collieries Searsole, Rajbati.	Searsole steam
7852	7320	Do.	Jemehiri	Do. do.	Jemehiri coal
*1664	2868	4 Oct. 1894	Madhubpur	Bengal Coal Company, Limited.	Madhubpur coal
*1668	2872	Do.	Sanctoria	Do. do.	Sanctoria coal
*1665	2869	Do.	Searsole	Do. do.	Coal from Searsole, Raniganj
7145	7090	6 Mar. 1896	Daltonganj	Dr. Saise, through Station Master, Gya.	Daltonganj coal, Rajhira seam.
7248	7100	28 Mar. 1896	Jheria	Bengal-Nagpur Coal Company, Limited, through George Alexander, Esq.	Coal taken from inclines at Buggutdeah in Jheria.
7249	7101	Do.	Do.	Do. do.	Coal taken from a quarry at Buggutdeah. These two samples are not only surface coal, but have been exposed to the atmosphere for some months.
7861	7322	13 July 1896	Barmondia	Managing Agent, Damuda Coal Company.	Coal from Barmondia Colliery.
7862	7315	Do.	Luchipur	Do. do.	Coal from Luchipur Colliery
7863	7318	Do.	Ghoosick	Do do.	Coal from Ghoosick Colliery
7864	7316	Do.	Bharatchak	Do. do.	Coal from Bharatchak or Damuda Colliery.

Calorific Value.	Fixed Carbon per Cent.	Ash per Cent.	Coke per Cent.	Volatile Matter per Cent.	Sulphur per Cent.	Caking Properties.	Colour of Ash.	Other Characteristics of the Coal.
6380	60·54	13·04	73·58	26·42	0·87	Cakes -	Light grey -	Exhibits a peculiar curved fracture. Part of the sample was of dull appearance and very tough, while the remainder was bright, and broke readily into small fragments.
6402	55·69	18·56	74·25	25·75	0·91	Do. -	Do. -	
7040	56·45	10·77	67·22	32·78	0·51	Do. -	White -	Laminated, very clean, cleaves in small cubes.
6644	64·80	7 37	72·17	27 83	0·42	Does not cake.	Dark yellow -	Dull black, clean, not very hard.
6985	66·80	5·35	72·15	27 85	0·40	Do. -	Yellowish brown.	Dull black, hard, clean, breaks into cubes.
6512	58·59	14·55	73·14	26·86	0·45	Cakes -	Dove - -	Dull, rather tough, breaks in every direction, with little dust.
7183	60·93	9·99	70·92	29·08	0·43	Do. -	Buff - -	Clean, but rather dusty, crumbles readily, bright in layers.
6655	49·95	8·48	58·43	41·57	0·29	Do. -	Light yellow -	Bright, dirty, fairly hard.
6721	57·70	8·62	66·32	33·68	0·53	Do. -	White - -	Mixed dull black and glossy, the latter crumbles readily, clean.
5852	42·50	14·64	57·14	42 86	0·32	Do. -	Brownish yellow.	Dull and glossy laminæ, clean and hard.
6657	64·20	12·08	76·28	26·72	1·50	Do. -	White - -	A dull black coal, clean and hard.
6809	51·36	10·61	61·97	38·03	0·79	Does not cake.	Terra-cotta -	Alternate dull and bright layers, breaks easily in small fragments, clean.
6545	47·85	9·68	57·53	42·47	0·35	Cakes -	Flesh colour -	Alternate bright and dull layers, breaks easily in small fragments with little dust, clean.
7084	51·86	8·86	60·72	39·28	0·39	Do. -	Do. -	Dull with many bright patches, clean.
6985	55·92	12·30	68·22	31·78	0·95	Do. -	Dirty pink -	Dull with bright patches, breaks easily in layers, clean.
6215	57·31	14·86	72·17	27·83	0·75	Do. -	Grey white -	Dull silky coal with glistening layers and patches. Hard and brittle, very clean.
6380	49·41	11·29	60·70	39·30	1·63	Do. -	Lemon yellow	A glossy coal, hard, but with soft patches.
6512	44·25	8·87	53·12	46·88	0·33	Do. -	Fawn -	Alternate layers of dull and bright coal, clean, easily broken, cleaving in layers.
6320	44·60	10·90	55·50	44·50	0·20	Do. -	Terra-cotta -	Alternate layers of dull and bright coal, hard, dusty when broken.
5698	38·80	17·12	55·92	44·08	1·54	Do. -	Brownish yellow.	A dull coal, laminated, hard, with soft patches, clean.
6325	49·32	10·74	60·06	39·94	1·53	Do. -	Yellowish grey	A dull coal with bright patches, hard and clean.
5863	42·71	12·03	54·74	45·26	1·51	Do. -	Fawn - -	A clean bright coal, cleaving in layers.
5591	62·35	14·04	76·39	23·61	0·92	Does not cake.	Yellowish brown.	Bright coal, rather hard, not very dirty, on same pieces a small amount of white deposit.
5747	56·35	17·88	74·23	25·77	0·90	Cakes -	White -	Bright glistening coal, brittle and hard, in places has a pitchy appearance.
5500	54;25	24·20	78·45	21·55	0·70	Do. -	Light grey -	Dull black coal with bright patches in places, cleaves occasionally with a silky fracture, rather hard, fairly clean.
6889	48·52	8·93	57·45	42·55	0·33	Do. -	Cream -	Clean, bright coal, easily broken, hard, but with soft patches.
6600	48·75	13·01	61·76	38·24	0·40	Do. -	Fawn -	In well-defined layers, part dull and part bright and glistening, clean, fairly tough, except that the bright layers crumble readily.
5954	43·69	12·16	55·85	44·15	0·095	Do. -	Light fawn -	Well-defined layers of dull and bright coal, the former tough, the latter rather brittle.
6710	47·69	10·22	57·91	42·09	0·78	Do. -	Fawn -	Bright coal, fractures readily. Made up of a dull and bright portion. Dull portion tough, whilst the bright is readily broken.

Indian Invoice Number.	Imperial Institute Number.	Date.	Mine.	Whence received.	Remarks made in forwarding Sample.
8192	7768	25 Nov. 1896	Chattabad	Katras-Jheria Coal Company, Limited, Katras Collieries, Manbhum.	Ghattabad, No. 12 seam
8193	7770	Do.	Moulkara	Do. do.	Moulkara, East Colliery, No. 13 seam.
8194	7769	Do.	Do.	Do. do.	Moulkara, South Colliery, No. 14 seam.
8195	7771	Do.	Do.	Do. do.	Moulkara, West Colliery, No. 15 seam.
8196	7772	Do.	Choitoodee	Do. do.	Choitoodee, No. 15 seam
8197	7762	Do.	Nundie	Adjai Coal Company, Limited, Nundie Colliery, Raniganj.	No. 1 sample
8198	7765	Do.	Do.	Do. do.	No. 2 sample
8199	7774	Do.	Kalipahari	Srikistopore Coal Company, Kalipahari.	Steam coal
8260	7766	Do.	Kustore	Raniganj Coal Association, Limited.	Coal from Kustore Colliery, Jheria.
8261	7757	Do.	Patlabari	South Barakar Coal Company, Patlabari Colliery, No. 2 seam.	——
8292	7761	Do.	Seebpore	Katras-Jheria Coal Company, Limited, Churnpore, Asansole, East Indian Railway, Seebpore Colliery.	Large lump
8292A	7763	Do.	Do.	Do. do.	Small pieces
8329	7767	Do.	Kustore	Raniganj Coal Association, Limited, 4, Fairlie Place, Calcutta.	Coal from Kustore Colliery, Jheria.
8723	8120	25 Feb. 1897	Koiloodee	Jheria Coal Company, Katras Collieries, Manbhum.	Koiloodee, No. 12 seam
				BURMAH.	
*3531	6157	4 Oct. 1894	Letkokbin	Burmah Coal Company, Limited.	From roof of seam
*3532	6158	Do.	Do.	Do. do.	From floor of seam
				CENTRAL INDIA.	
*256	1605	Do.	Umaria	Umaria Colliery	——
*322	1671	Do.	Do.	Do.	——
7093	7091	15 Feb. 1896	Do.	The Manager, Umaria Colliery	Sample from No. 3 seam, Middle area.
7094	7092	Do.	Do.	Do. do.	Sample from No. 2 seam, Middle area.
7095	7093	Do.	Do.	Do. do.	Sample from No. 2 seam, Northern area.
7096	7094	Do.	Do.	Do do.	Sample from No. 3 seam, Northern area.
7927	7449	22 July 1896	Do.	Do. do.	Sample from No. 4 seam, Northern area.
7928	7450	Do.	Do.	Do. do.	Samples from No. 4 seam, Middle area. "Information required as to their coking properties."
				CENTRAL PROVINCES.	
*1648	2852	4 Oct. 1894	Mohpani	The Nerbudda Coal and Iron Company, Limited, Mohpani Coal Mine.	From No. 1 seam
8284	7775	Do.	Do.	Do. do.	Sample A.
8285	7776	Do.	Do.	Do. do.	Sample B.
8286	7777	Do.	Do.	Do. do.	Sample C.
*316	1665	——	Warora	Warora Colliery	——
*318	1667	——	Do.	Do.	——

Calorific Value.	Fixed Carbon per Cent.	Ash per Cent.	Coke per Cent.	Volatile Matter per Cent.	Sulphur per Cent.	Caking Properties.	Colour of Ash.	Other Characteristics of the Coal.
6820	62·17	11·38	73·55	26·45	0·85	Cakes -	Greyish red -	A clean, rather bright, coal, easily broken.
6798	62·60	10·55	73·15	26·85	0·93	Do. -	Dirty white -	Laminated bright coal, dirty, breaks very easily, with much dust.
6672	58·85	14·36	73·21	26·79	0·83	Do. -	Do. -	Dull coal with bright layers, clean.
6358	58·64	13·15	71·79	28·21	0·75	Do. -	Reddish grey -	Bright coal in layers, clean.
6787	61·24	11·46	72·70	27·30	0·93	Do. -	Dirty white -	Bright coal in layers, breaks easily, clean.
6468	53·89	7·59	61·48	38·52	0·48	Does not cake.	Fawn -	Alternate bright and dull layers, the dull coal being dirty to handle.
6127	50·38	10·72	61·10	38·90	0·37	Do. -	Do. -	Dull slaty coal with many bright patches, rather tough, clean.
6116	48·76	10·47	59·23	40·77	0·34	Do. -	Reddish grey -	A bright coal with some duller layers.
6644	63·21	9·14	72·35	27·65	0·50	Cakes -	Do. -	Dull coal with bright layers, clean.
6666	57·15	11·30	68·45	31·55	0·63	Do. -	Do. -	Dull coal with bright layers, easily broken, with much dust, dirty to handle.
5830	54·58	8·31	62·89	37·11	0·45	Does not cake.	Fawn -	Alternate dull and bright layers, very dirty, breaks easily, with much dust.
5841	52·15	8·28	60·41	39·59	0·51	Do. -	Light fawn -	Alternate dull and bright layers, breaks easily, clean.
6666	63·71	8·58	72·29	27·71	0·61	Cakes -	Reddish white	Dull coal with graphitic lustre in oval pieces, and conchoidal fracture, breaks easily in layers with some dust, clean to handle.
6402	60·23	15·90	76·13	23·87	0·83	Do. -	Dirty white -	Rather bright coal with a silky lustre, breaks easily, with some dust.
†	33·57	8·50	42·07	57·93	0·33	Does not cake.	White - -	Dull black, clean and hard, with rounded surfaces and fracture.
†	3·58	68·39	†	28·05	0·11	Do. -	Do. -	Dull black, with glossy patches, very soft and soapy to touch, clean.
5390	59·65	23·63	83·28	16·72	0·32	Do. -	Do. -	A clean dull coal with irregular cleavage, easily broken.
5247	55·97	26·60	82·57	17·43	0·43	Do. -	Greyish white	Dull, soft, clean, and contains fossilized resin.
5940	63·63	15·99	79·62	20·38	0·76	Do. -	White - -	Small quantities of white substance between the layers in places. Rather dirty to handle.
5445	56·66	23·17	79·83	20·17	1·09	Do. -	Do. -	Similar to 7094.
5337	45·99	14·94	60·93	39·07	1·02	Do. -	Do. -	Similar to 7094. Traces of iron pyrites in cleavages, rather tough.
5481	50·38	14·98	65·36	34·64	1·81	Do. -	Do. -	Similar to 7094 and 7095, but not so dirty to handle. It also shows a silky patched appearance when cleaved.
5665	43·42	21·07	64·49	35·51	1·89	Do. -	Reddish white	Tough coal of dull appearance, cleaving in layers.
5819	48·99	24·28	73·27	26·73	2·03	Do. -	Dirty white -	Dull, with small bright patches, irregular cleavage, easily broken, with much dust, dirty.
5104	42·46	24·30	66·76	33·24	0·50	Do. -	Brownish yellow.	Dull, laminated, very hard fairly clean.
6358	49·83	8·88	58·71	41·29	0·52	Do. -	Light fawn -	A shaly coal, dull, with bright spots in layers, breaks easily, dirty, gives much dust.
6336	60·64	8·33	68·97	31·03	0·47	Do. -	Do. -	A dull coal, very light, breaks easily, much dust, very fibrous.
5060	50·81	11·93	62·74	37·26	1·03	Do. -	Terra-cotta -	A dull coal with some bright layers, breaks easily, with much dust, very dirty.
5583	41·40	13·50	54·90	45·10	0·94	Do. -	White -	Dull, with bright patches, clean, and rather soft.
5500	40·97	12·78	53·75	46·25	1·21	Do. -	Do. -	A clean silky coal, easily broken, cleaving in cubes.

† Does not burn readily.

Indian Invoice Number.	Imperial Institute Number.	Date.	Mine.	Whence received.	Remarks made in forwarding Sample.
8130	7779	1 Sept. 1896	Warora	Manager, Warora Colliery	From No. 2 pit
8131	7760	Do.	Do.	Do. do.	From No. 4 pit
8132	7759	Do.	Do.	Do. do.	From No. 5 pit
8133	7773	Do.	Do.	Do. do.	From No. 1 seam, No. 2 pit
*1649	2853	4 Oct. 1894	Mohpani	The Manager, Mohpani Mines	No. 2 seam
*1650	2854	Do.	Do.	Do. do.	No. 3 seam
*1651	2855	Do.	Do.	Do. do.	No. 4 seam
			NIZAM'S DOMINIONS.		
*87	1436	—	Singareni	Hyderabad	—
7803	7308	—	Do.	Agent and General Manager, Hyderabad (Deccan), Company.	Singareni coal
			PUNJAB.		
7070 and 7071	7083 and 7084	3 Feb. 1896	Dandot	Mining Manager, Colliery District, North-Western Railway.	Two boxes of Dandot steam coal.
7072 and 7073	7085 and 7086	Do.	Pidh	Do. do.	Two boxes of Pidh steam coal. These are very friable and deteriorate rapidly if exposed to the air, and when in bulk are apt to fire by spontaneous combustion.
7109 and 7110	7313 and 7314	25 Feb. 1896	Baghanwalla	Do. do.	Two boxes of Baghanwalla coal.
7118	7095	13 Feb. 1896	Pidh	Do. do.	Pidh Shale It is believed to contain mineral oil, and is known to contain gas. Precise information desired on these points.
7134	7096	25 Feb.	Dandot	Do. do.	Dandot Shale, the same information desired as above (Pidh Shale).
7692	7319	20 April 1896	Shahrig	Executive Engineer, Shahrig District, North-Western Railway.	Takrai top seam coal from Mainway, West.

Calorific Value.	Fixed Carbon per Cent.	Ash per Cent.	Coke per Cent.	Volatile Matter per Cent.	Sulphur per Cent.	Caking Properties.	Colour of Ash.	Other Characteristics of the Coal.
5514	39·96	11·86	51·82	48·18	0·98	Does not cake.	Greyish white	Slaty dull coal with some brighter patches, rather dirty.
5082	43·12	15·80	58·92	41·08	2·37	Do. -	Do. -	Same as 8130.
5335	44·57	12·75	57·32	42·68	0·77	Do. -	Dirty white -	Same as 8130.
4840	40·97	20·75	61·72	38·28	0·64	Do. -	Slightly yellow	Slaty dull coal with only a few bright spots, dirty, rather tough.
5324	42·61	20·13	62·74	37·26	0 39	Cakes -	White -	Dirty, alternate layers of dull and very hard coal and bright coal, easily broken.
5566	41·00	19·65	60·65	39·35	0·44	Do. -	Yellowish brown.	
6116	45·35	9·23	54·58	45·42	0·43.	Do. -	Light yellow -	Dull, hard, and clean with occasional glossy layers.
5544	43·55	12·71	56·26	43·74	0·29	Does not cake.	Yellowish brown.	Irregular fracture, extremely hard, dull, clean coal, with thin streaks of glossy coal.
5885	54·68	8·61	62·84	37·16	1·28	Cakes slightly.	Dark fawn -	Very tough, dull, with bright patches.
5995	38·32	13·10	51·42	48·58	1·86	Does not cake.	Reddish white	Dull with bright patches, easily broken, clean.
6237	39·44	10·00	49·44	50·56	3·20	Do. -	Flesh colour -	Clean, rather bright, easily broken, with little dust.
4820	29·54	36·58	66·12	33·88	2·24	Cakes slightly.	Dirty yellow -	Dull, breaks readily with irregular fracture, white substance, brown resin.
4270	27·79	39·91	67·7	32·30	2·18	Do. -	Flesh colour -	Similar to 7109.
4470	27·30	31·93	59·23	40·77	4·41	Does not cake.	Dirty white -	This shale is in layers. A resinous substance is found occasionally between the layers. Mineral oil by distillation, small. Yield of gas low, illuminating power deficient.
1943	12·84	60·99	78·83	26·17	2·86	Do. -	Light fawn -	Dull, grey black coal with soapy touch. Contains a small quantity of brown resinous matter. Mineral oil, very small, yield of gas very low, illuminating power small.
6730	38·74	11·81	50·55	49·45	1·67	Cakes -	Creamy brown	Easily broken, a quantity of a micaceous substance between the layers.

Results of ultimate Analyses of Selected Indian Coals.

Indian Invoice Number.	Province and Mine.	Carbon.	Hydrogen.	Ash.	Moisture.	Sulphur.	Nitrogen, Ozogen, &c.
	Assam :—						
1828	Makum	77·31	5·43	1·27	3·07	1·02	11·90
96	Cherra Punji	77·75	5·83	4·74	1·45	3·98	6·25
97	Maoflong	75·05	5·17	3·23	3·15	3·08	10·32
	Baluchistan :—						
93	Khost	71·38	4·97	5·57	3·85	4·82	9·41
94	„	70·58	5·55	10·64	2·46	0·74	10·03
	Bengal :—						
99	Kumardubhi	70·43	4·70	13·85	1·86	0·53	8·63
	Karharbari—						
639	Lower Seam	80·75	4·32	7·37	1·23	0·42	5·91
641	Upper Seam	83·53	4·59	5·35	1·28	0·40	4·85
1658	Sodepore	72·09	4·87	9·03	3·54	0·29	10·18
1659	Liakdee	74·33	4·60	9·29	2·23	0·53	8·02
	Burmah :—						
3531	Letkokbin	60·25	4·64	9·28	11·55	0·33	13·95
	Central Provinces :—						
1651	Mohpani	67·65	4·37	9·73	7·07	0·43	10·75

Table III.

Previous Analyses of Indian Coal.

Province and Mine.	Calorific Value.	Fixed Carbon.	Ash.	Coke.	Volatile Matter.	Sulphur.	References.
Assam :—							
Cherra Punji	—	62·0	0·9	62·9	37·1	—	J. Prinsep.
Langrin coal field Khasia Hills—							
Seam No. 1	—	50·40	8·66	59·06	41·0	—	T. D. La Touche, Geol, Survey, Rec. XVII., 1884.
Seam No. 2	—	50·80	6·60	57·4	42·6		
Daranggiri, Khasia Hills—							
No. 1	—	47·7	7·7	55·4	44·6	—	T. D. La Touche, Rec. Geol. Surv., Vol. XV., Part 3, 1882.
No. 2	—	51·8	2·6	54·4	45·6	—	
No. 3	—	4·0	71·8	75·8	24·2	—	
No. 4	—	14·0	51·8	65·8	34·2	—	
No. 5	—	27·4	29·6	57·0	43·0	—	
Maoflong, Khasi Hills—							
No. 1. Dedum Hill	—	37·8	31·6	69·4	30·6	—	F. R. Mallet, Rec. Geol. Surv., VIII., 1875.
No. 2. Maobelaka	—	55·2	1·8	57·0	43·0	—	
Makum	—	53·0	2·0	55·0	46·5	—	Handbook, p. 34, (Gas Light and Coke Co.)
Makum (average)	—	75·70	1·12	76·82	23·18	—	F. R. Mallet, 1876.
Average of 27 analyses of Assam coal.	—	60·0	3·8	63·8	36·2	—	Ball's Geology.
Chittagong, A.	—	36·5	25·5	62·0	38·0	—	
„ B.	—	25·9	38·3	64·2	35·8	—	
Assam coal	13·99	53·42	1·60	55·02	44·98	2·52	T. H. Ward, Handbook.
Baluchistan :—							
Khost Colliery	—	46	4	50	50	—	Handbook.
Bengal:—							
Raniganj (average of 31)	—	53·9	16·17	70·07	30·63	—	Handbook, P. N. Bose, 1890.
„ (North Bengal Coal Company, upper seam.	—	74·31	10·43	84·74	14·79	0·47	Dr. Saise, Handbook.
„ Alipore (average)	12·89	60·86	14·63	75·49	20·81	1·36	T. H. Ward.
„ (Barakar)	—	64·26	7·27	71·53	27·63	1·56	T. H. Ward, Handbook, page 5.
„ (Dhadka)	—	49·61	7·64	57·25	42·75	—	
„ (Borrea)	12·35	60·70	10 03	70·73	29 27	—	
„ (Belrooi)	12·40	53·70	9·59	63·29	36·75	—	
„ average of 16	—	51·08	16·27	67·35	32·65	—	Mem. Geol. Survey.
„ good specimen	—	51·80	10·70	62·50	37·50	—	
Karharbari, lower seam	7333	66·84	9·15	75·99	24·00	0·42	Saise, Ball's Geology and Handook.
„ „	7183	67·51	11·67	79·18	20·82	0·72	
„ „	7333	64·67	9·53	74·20	25·50	0·84	
„ upper seam	6944	60·46	11 96	72·42	27·59	0·52	
„ Bhadua seam	6888	61·03	13·60	74 63	25·37	0·80	
„ „	6811	61 45	18·08	79·53	20·46	—	
„ Khundiha seam	6111	59·10	22·32	81·42	18·58	—	
„ average	7083	63·66	12·33	75·99	24·01	0·66	

Province and Mine.	Calorific Value.	Fixed Carbon.	Ash.	Coke.	Volatile Matter.	Sulphur.	References.
Bengal—*cont.*							
Karharbari, (Giridih Coal, Bengal Coal Company).	86·58	60·30	14·16	74·46	25·54	—	Geol. Dept. 1891.
Karanpura (Damuda)	—	64·5	8·5	73·0	27·0	—	Ball's Geology.
Aurunga (Damuda)	—	36·5	27·5	64·0	36·0	—	
Daltonganj (Koel Valley)	—	64·8	10·7	75·5	21·05	3·45	
,, No. 1	—	40·44	48·52	88·96	11·04	—	T. D. La Touche, Geol. Survey, Reports and Handbook.
,, No. 1A	—	38·78	31·32	70·10	29·90	—	
,, No. 2	—	30·34	52·78	83·12	16·88	—	
,, No. 4	—	44·50	17·10	61·60	38·40	—	
,, No. 9	—	54·24	12·10	66·34	33·66	—	
,, (Palamow Coalfield, average).	—	56·49	11·74	68·23	31·77	—	Saise, Handbook.
Hutar (Koel Valley)	—	55·35	10·7	66·05	33·95	—	Ball's Geology.
Darjiling (average of 8)	—	59·56	17·42	76·98	22·94	—	P. N. Bose, Handbook.
Tindaria (not worked)	—	65·22	27·68	92·90	7·10	—	T. H. Ward, Handbook.
Antargaon seam, Barakar rocks	—	51·26	20·49	71·75	28·25	—	Ball's Geology.
Kairgura seam, Barakar rocks	—	45·6	12·2	57·8	42·2	—	
Burmah :—							
Murray Coal Company	13·06	50·0	13·36	63·36	36·44	—	T. H. Ward, Handbook.
Shwebo (Burmah Coal Company), seven outcrops—							
Lwindaw	68·93	47·62	1·86	49·48	50·52	—	Handbook, pp. 61, 62.
Ketsobin, No. 1	55·56	41·72	8·46	50·18	49·85	—	
,, No. 2	33·95	21·56	39·08	60·64	39·36	—	
Letkobin, No. 1	56·58	36·22	14·16	50·38	49·62	—	
,, No. 2	43·21	24·28	32·32	56·60	43·40	—	
Chadouk	40·13	24·56	35·36	59·92	40 08	—	
Kodaung	36·01	35·88	21·70	57·58	42·42	—	
Letkobin seam, top coal	—	46·60	7·10	53 70	46·30	—	
,, ,, bottom coal	—	38·80	14·90	53·70	46·27	—	
Kyetsobin outcrop, top coal	—	44·20	7·45	51·65	48·35	—	
,, ,, bottom coal	—	36·65	14·23	50·88	49·15	—	
Kadoung	—	36·85	23·90	60·75	39·25	—	
Luindaha	—	36·10	22·50	58·60	41·40	—	
Upper Chindwin (average of 11)	—	49·95	5·30	55·25	44·73	—	
Mergui, Great Tenasserim River A.	—	30·86	23·86	54·72	45·28	—	Handbook, p. 65. T. W. Hughes.
Mergui, Great Tenasserim River B.	—	42·52	19·32	61·84	38·16	—	
Mergui, Great Tenasserim River C.	—	43·27	8·99	52·26	47·74	—	
Kale Creek Coal, Chindwin Valley.	—	59·29	3·11	62·40	37·60	—	D. Hooper, 1887. Review of Mineral Production, 1896.
Letkonbin	—	55·71	3·48	59·19	40·81	—	
Central India :—							
Umaria (1885)	—	71·77	16·03	87·80	12·20	Trace.	Handbook.
,,	—	66·71	8·12	74·83	25·17	—	T. H. Ward.
Central Provinces:							
Mohpani	—	64 to 70	10 to 15	74 to 85	12 to 22	1·00	Handbook.
Warora, large coal	—	45·6	14·4	60·0	40·0	—	
,, slack coal	—	35·5	24·0	59·5	40·4	—	
,,	—	45·4	14·2	59·6	40·4	—	Ball's Geology.
Ghugus (average of 16)	—	45·61	20·9)	66·51	33·49	—	
Warora (average)	—	42·85	8·99	51·84	48·16	0·849	Handbook.
Pisgaon	—	65·1	15·7	80·8	19·2	—	Ball's Geology.
Johilla (1882), not worked	—	57·95	13 55	71·50	28·50	—	Handbook.
Nizam's Dominions :—							
Singareni, A.	—	62·4	15·00	77·4	22·6	—	
,, B.	—	66·0	11·00	77·0	23·0	—	
,,	—	56·0	12·00	68·0	32·0	—	
,,	—	58·0	10·14	—	25·10	1·20	
Punjab :—							
Quetta coal (North - West Frontier).	—	51·86	4·06	55·92	42·08	—	Handbook.

Typical British Coals.

Province and Mine.	Calorific Value.	Fixed Carbon.	Ash.	Coke.	Volatile Matter.	Sulphur.	References.
Welsh coal	Average cal. val. 6–7,000 cals.	82·66	3·68	86·34	13·66	1·59	Official report on coal for navy.
Newcastle		63·25	3·49	66·74	33·26	1·07	Indian Handbook.
Bristol Lower Series (Steam)		69·35	6·16	75·51	24·48	1·56	Saise, Ball's Geology.
,, Upper Series (Gas)		60·67	5·60	66 27	33·73	1·36	

NOTE.—For diagrams, and map showing railways and coalfields, *see* after p. 90.

Appendix H.

SELECTIONS from CORRESPONDENCE ("Flying Seal" and "Direct"), 1897–8, between the IMPERIAL INSTITUTE and DEPARTMENTAL OFFICERS IN INDIA.

A.

From Sir Frederick Abel, Bart., K.C.B., Secretary and Director, Imperial Institute, to George Watt, Esq., M.B., C.M., C.I.E., Reporter on Economic Products to the Government of India.

Pine Apple Fibre.

No. 186/3.

(Flying Seal Series, No. 112.) Imperial Institute, London,

Sir, 29th May 1897.

With reference to a sample of pineapple fibre from Assam, which has been handed to me by Mr. Royle for submission to practical experts, I have to state that inquiry has been made of one of our referees as to whether a few pounds of the material can be supplied at once for textile purposes, as he believes he is enabled to have this done by a new process which is giving good results with other fibres.

I thought it right to communicate this inquiry to you without loss of time.

I have, &c.

F. A. ABEL.

Rubber from Burma.

No. 191/3.

(Flying Seal Series, No. 113.) Imperial Institute, London,

Sir, 3rd June 1897.

Mr. Royle has forwarded to me a sample of rubber from Burma, together with a copy of a letter addressed by you to him on the 13th January last asking for a report upon the same.

I have now the pleasure to state that the sample was found to contain 7·8 per cent. of a light green oleo-resinous substance foreign to indiarubber. The specimen has been submitted by me to experts, with the following results:—

By brokers it was described as good clean red ball, with soft white, rather bady heated outside, and worth from 1*s.* 11*d.* to 2*s.* per lb. By the experts of large cable manufacturers, it was reported to contain less than one-half per cent. of dirt and water, but about 7½ per cent. of resinous matter—probably due to its having been badly heated. Rubber represented by the specimen, but in better condition as regards preparation, would have a value at the present time of from 1*s.* 8*d.* to 2*s.* per lb. for insulating purposes.

I have, &c.

F. A ABEL.

Phœnix paludosa.

No. 211/3.

(Flying Seal Series, No. 114.) Imperial Institute, London,

Sir, 14th June 1897.

With reference to your letter of the 22nd April last (863–85A) on the subject of the possibility of utilizing the stem fibres of *Phœnix paludosa*, I enclose herewith a memorandum from the Director of the Scientific Department of the Imperial Institute upon the subject, from which you will see that there is very little prospect of securing a market in this country for the same fibre of that plant.

With respect to Professor Dunstan's remark on the question of the utilization of the leaves for paper-making, I quite understand from your letter that such

an application of the leaves was contemplated by you as only practicable in India, and that you did not expect that this material could compete in cost with the paper-making materials used in this country.

I have, &c.
F. A. ABEL.

Enclosure in above.

Report by the Director of the Scientific Department of the Imperial Institute on the Fibre of *Phœnix paludosa*.

With reference to Dr. Watt's letter (F. S. S. 863–85A), dated 22nd April 1897, requesting that the further attention of the Scientific Department may be drawn to the subject of the possible utilization of the stem fibre of *Phœnix paludosa*, which had been examined in October 1895, and reported to be of small commercial value (F. S. S. No. 58), I have to say that it appears to me that the only directions in which an improvement of the fibre might be effected are in ascertaining the exact time of year at which the crop should be cut, and in considering whether the method of treating the fibre could be improved.

I have again submitted a sample of the original consignment of the fibre received in 1895 to our fibre expert, asking for his opinions on these points, and drawing his attention to the possible value of the leaves of this plant for paper-making. In reply, he states that, having examined the fibre, he finds it very "sere" and brittle, and not saleable in this country in its present condition. Comparing the condition of the fibre at the present time with its condition two years ago, it would appear that considerable deterioration has taken place. He points out that with very rare exceptions stem fibres are of little value, though possibly an improved fibre might be obtained if the plants were cut down before they reached maturity, and that probably a still better fibre could be obtained from the leaves. With regard to the utilization of the leaves for paper-making, he remarks that, with ample supplies of wood-pulp, and other good materials at very low prices, the leaves would probably have only a local value for paper-making, and would not bear the cost of transit and freight to Europe.

WYNDHAM R. DUNSTAN.

Mica Preparations.

No. 224/3.

(Flying Seal Series, No. 115.) Imperial Institute, London,
Sir, 9th July 1897.

Mr. Royle, the Curator of the Indian Section, forwarded me a short time since samples of mica preparations, concerning which you requested an examination of the same. These samples appear to have been prepared by Messrs. Floyd and Boilard.

I may state at once that they were merely preparations of an ordinary character, in which finely-divided mica is utilized, and cannot be said to present any properties of very special character. Similar preparations are sold here, and in other countries, the basis of which is finely-divided asbestos, which possesses very similar characters to those of the finely-divided mica preparations.

The "mica powder prepared by process of liquefaction" is merely finely-divided mica, and it is evident that the term "liquefaction" is used in error for *levigation*.

The so called "mica-jelly" is finely-divided mica made into a paste with vaseline or mineral jelly.

The "Micacious Insoluble Phenyle" is pulverised mica mixed with coal tar, and the "Gold Mica Paint" appears to be ordinary gold paint with an addition of finely-divided mica.

The "Mica Filter Block" closely resembles similar silicious blocks prepared in this country from asbestos and other silicious materials.

I have, &c.
F. A. ABEL.

Aconite.

No. 237/3.

(Flying Seal Series, No. 116.) Imperial Institute, London,
Sir, 22nd July 1897.

I have the honour to forward herewith, for the information of your Department, two copies of a paper recently published by the Chemical Society, by Professor Dunstan and one of the assistants in the Scientific Department here, Mr. F. H. Carr, being further contributions to our knowledge of aconite.

I have, &c.
F. A. ABEL.

Coal.

No. 236/3.

(Flying Seal Series, No. 117.) Imperial Institute, London,
Sir, 22nd July 1897.

I have the pleasure to inform you that the examination of the last series of samples of coal which we have received from your department is now completed, and a report on the same is in course of preparation. It would, in fact, have been sent before this, but as it is desirable, in connexion with the preparation of the Report, to have before us the latest statistics regarding the production of coal, &c., in India, Professor Dunstan is delaying its completion until the official report* on this subject for 1896 reaches us, as I am given to understand it will in the course of October next.

I have, &c.
F. A. ABEL.

Rubber from *Ficus Elastica*.

No. 241/3.

(Flying Seal Series, No. 118.) Imperial Institute, London,
Sir, 30th July 1897.

With reference to your letter, No. 774–32 F.S., dated 7th April 1897, forwarding a further sample of rubber, described "Rubber from *Ficus Elastica*, "from Bhamo Division, Burma, No. 8994 C.," and asking for a report upon the same, I have now the pleasure to state that the sample was found to contain about 6 per cent. of dirt and water and 2·4 per cent. of resinous matter. The specimen has been submitted by me to experts, with the following results:—

By brokers it is described as good, clean Rangoon ball, value 2*s.* 5½*d.* per lb. The material is on the whole very similar to the sample from Upper Burma examined some time ago; if anything, it is of rather better quality, the amount of resinous matter being notably less.

I think it right to mention, however, that one of the largest firms of cable manufacturers who use rubber for insulating purposes only estimate it to be worth—as mostly resembling Java rubber—1*s.* 10*d.* per lb.

I have, &c.
F. A. ABEL.

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* "Review of Mineral Production in India, 1896."

"Bowstring Hemp" and *Mudar*.

No. 273/3.

(Flying Seal Series, No. 119.) Imperial Institute, London.

Sir, 18th September 1897.

In Flying Seal letter addressed by me to you, No. 28, dated 17th July 1894, I asked that the Imperial Institute might be furnished with samples of the fibres of *Marsdenia tenacissima*, *Calotropis gigantea*, and *Calotropis procera* "in some quantity," and in your letter of the 28th August of that year you informed me that the fibres in question were registered to be dealt with in the year 1895–6. You also explained that *Calotropis procera* afforded two fibres but that it was presumed that the *bark* fibre was the one which we desired to possess. Up to the present time we have not received a sample of the bark fibre in question, but in June last I received from Mr. Royle a sample of the silk-cotton (floss) of *Calotropis procera*, to which reference was made by you in your letter to him of 7th July 1896. This floss was forwarded, together with the seeds, which, in the letter just referred to, you spoke of as deserving of chemical examination in consequence of the high position which the bark of the plant furnishing them stands in popular favour as a medicinal agent. The seeds were handed over to Professor Dunstan for examination, and will, no doubt, be shortly reported upon. The floss has been submitted by me to our scientific referee on fibres, Mr. C. F. Cross, who has just reported the following as the results furnished by its examination. The more important constants of the fibre, which has the chemical characteristics of lignocellulose, are as follows:

Moisture	-	9·0 per cent.
Ash	-	3·0 „
Hydrolysis	- Alkali (1 per cent. Na O H)	26·2 per cent. (loss).
	- Acid (1 per cent. H_2 S O_4)	24·7 „ (loss).
Cellulose	-	69·8 per cent.
Furfural	-	19·5 „

Mr. Cross states that this floss fibre is an extremely interesting chemical type, containing as it does a very high, and, in his experience, unique percentage of furfural. He adds, however, that although it may find use for some applications of floss fibre, its somewhat unfavourable chemical characteristics are not likely to recommend it to the spinner in view of the present low price of cotton.

I have also submitted a sample of the floss of Calotropis to our practical expert referee, Mr. C. E. Collyer, who reports as follows:—"This particular "floss was in considerable demand in the markets a few years ago for fancy "textile purposes, but, owing to the difficulties presented by the variations in "the quality of the parcels supplied, and to the intermittent supply when "requirements arose, the material has dropped out of use. The quality of "the Indian growth is inferior to the product of Java, which is probably "derived from *Calotropis gigantea*, small samples of which have occasionally "been received from India. The specimen now submitted is of fair colour "and of rather short staple, and somewhat towy in character, containing an "excessive quantity of inferior immature fibre and seed fragments."

He has had under his hand many varieties of the floss in question, mostly from Calcutta (where it is sometimes called "akund cotton"), which were mostly inferior to the sample now submitted to him. These samples were sold at as low a price as one penny per pound, and there was but little demand for them at that price. The trade in this floss may possibly be revived if a moderate but continuous supply can be guaranteed. If of good quality it would realise prices ranging from 4*d*. to 5*d*. per pound, c. f. and i. terms. In packing for sale, the floss should be handled as little as possible, the pods and seeds being entirely removed, and the floss left in its natural condition unopened; any discoloured portions should be separated and forwarded separately. The bales received here from Java usually contain 80 to 90 pounds of floss tightly sewn in canvas, but not pressed.

I presume that we shall receive, as promised, samples of the *bark* fibre of *Calotropis procera*, as its chemical examination is of interest in view of the popularity of the bark as a medicinal agent.

I have, &c.

F. A. ABEL.

Pine Apple Fibre.

No. 347/3.

(Flying Seal Series, No. 121.) Imperial Institute, London,
4th November 1897.

Sir,

Referring to your letters of the 6th July and the 4th August, sent in response to my application for a somewhat larger sample of pineapple fibre than that forwarded by you to Mr. Royle in January of this year, I have now the pleasure of communicating to you the results of chemical examination of the fibre, and the opinion furnished by our expert referee for fibres with regard to its quality and value.

The results furnished by examination of the specimen first received, by the comparative method followed in all instances in the Scientific Department, are as follows:—

The fibre contained 0·9 per cent. of mineral constituents or ash; 11·33 per cent. of moisture in its normally dry condition; and the percentage of cellulose was 80·87. Its loss in weight by submission to (A) hydrolysis amounted to 14·21 per cent., and by (B) (hydrolysis to 18·12 per cent. Treated by the mercerising process it lost 17·32 per cent.; its acid purification entailed a loss of 1·52 per cent.; and it gained 35·83 per cent. by nitration.

The average length of the ultimate fibre was 2·6 min., but on submission of the second sample received to practical tests, the yield of "line," or long-spinning fibre, was much higher in proportion than that obtained from medium European flax; and the spinning qualities of the long, as well as of the shorter fibre, are reported to be good. The second sample received was too small to yield exact practical results, but so far as can be judged by its behaviour, the fibre is very promising in character, and, when well prepared, yields material more nearly resembling flax in character than hemp, which would be very suitable for spinning into fine twine and for textile purposes if it be properly softened.

It is considered that the results furnished by the sample under examination are sufficiently good to warrant the recommendation that a sample shipment of at least five tons be made to England for trial purposes. That quantity would suffice to yield exact practical results on a fair working scale, as to its application by spinners, &c., to various purposes. The fibre would have to be submitted to a preparing process, which would not be costly, and would be available for use in India if it be considered desirable eventually to treat it on the spot, after its value had been thoroughly determined here.

At the present time the value of fairly clean fibre in the London market would probably be from 20*l.* to 25*l.* per ton. A specimen of the "line" or long thin fibre furnished by the sample operated upon is forwarded herewith.

I have, &c.
F. A. ABEL.

"Tannin Matters."

No. 364/3.

(Flying Seal Series, No. 122.) Imperial Institute, London,
15th November 1897.

Sir,

I have the pleasure to send you herewith, for the information and use of the Government of India, copies of contributions recently published by Mr. A. G. Perkin, of the Yorkshire College, Leeds, to the History of Yellow Colouring Principles of Various Tannin Matters, which are of interest in connexion with the study of tannin materials occurring in India, although the particular specimens which form the subject of the present researches are derived from other countries.

I have, &c.
F. A. ABEL.

Mudar.

No. 435/3.

(Flying Seal Series, No. 123.) Imperial Institute, London,
Sir, 8th December 1897.

I have to acknowledge with many thanks the receipt of your letter of the 13th ultimo, relating to the reports forwarded by me on the results of chemical examination and commercial valuation of silk cotton of *Calotropis procera*.

In reference to the second paragraph of your letter, I may point out that the inquiries made by our trade expert relate to the possible revival of the trade in this floss fibre.

I have, &c.
F. A. ABEL.

Aconite.

No. 485/3.

(Flying Seal Series, No. 125.) Imperial Institute, London,
Sir, 22nd December 1897.

I have to acknowledge the receipt of your letter of the 2nd instant relating to the subject of Professor Dunstan's investigation of the constituents of some Indian *Aconites*, and am glad to learn that steps have been taken by you to obtain a further supply of the roots of *Aconitum Napellus* and *Aconitum ferox*. I note that these cannot be collected until next season.

I have, &c.
F. A. ABEL.

India Rubber.

No. 494/3.

(Flying Seal Series, No. 126.) Imperial Institute, London,
Sir, 30th December 1897.

In reply to your letter of the 11th August 1897, No. 1704/XVI./32, advising the dispatch of samples of india-rubber, and asking for a report on their chemical properties and market value, I have the honour to inform you that the nine samples were valued by brokers, as follows:—

		Value per lb.	
		s.	*d.*
9189	Fine, clean, red Rangoon ball	2	9
9190	Fine, clean, but barky, Rangoon ball	2	8
9191	Do. do.	2	7½
9192	Do. do.	2	7½
9193	Do. do.	2	8
8994	Fair ball, slightly sandy and heated, Rangoon ball	2	2
8994A	Clean ball, black and slightly barky, Rangoon ball	2	6½
8994B	Good, but barky, and inclined to heat, Rangoon ball	2	7
8994C	Heated, Rangoon ball	2	2

The samples were also submitted to one of the large manufacturing companies of insulated wires and telegraph cables, who reported the rubber to be of rather inferior quality, very dirty, partially decomposed, and quite useless for purposes of cable construction.

The samples were classed by this company in two groups, the one, consisting of Nos. 9189 to 9193 inclusive, being of light brown colour, and showing but little decomposed substance; and the other, consisting of Nos. 8994 8994A, B, and C, being darker in colour, and containing notably more decomposed rubber.

An average sample of each group was examined, and the following impurities found:—

	Water.	Dirt.	Resinous Matter.
Group I. - -	1 per cent. -	6 per cent. -	18 per cent.
Group II. - -	1 „ -	17 „ -	6 „

Group I. contains much less dirt, but notably more resinous matter than Group II., but nevertheless the former is considered the better of the two.

Group I. is estimated by this firm to be worth from 1*s.* 10*d.* to 2*s.* per lb.; Group II., 1*s.* 6*d.* to 1*s.* 8*d.*

It will be seen that the classification of the samples by this company corresponds with the difference in value assigned by the brokers to the first five and to the last four samples.

The inferior quality of the rubber is unquestionably due to want of care or of experience, or of both, in its preparation for the market.

I have, &c.
F. A. ABEL.

New Food Grain.

No. 526/3.

(Flying Seal Series, No. 127.) Imperial Institute, London,
Sir, 6th January 1898.

Referring to your letter No. 3880/152A, F.S., not dated, but received on the 20th January 1897, I have now the pleasure of forwarding to you a report just received from Professor Church, one of the scientific referees to the Imperial Institute, on the results obtained by him in the examination of the new edible grain to which you refer in that letter. You will see that the report speaks very favourably in regard to the nutrient-ratio and the nutrient-value of this grain.

I have, &c.
F. A. ABEL.

Enclosure in above.

Results of examination of a sample of *Oryza coarctata*, Roxburgh; Syn. *O. triticoides*, Griffith (*see* Species 5 in Hooker's Flora of Britith India, Vol. VII., p. 93): a very distinct kind. By Professor A. H. Church, M.A., F.R.S.

The grain as received still retained the pericarp. One hundred of these grains weighed 18 grains.

On analysis the following percentage results were obtained:—

Water lost at 100° - - - - -	11·9
Albuminoids - - - -	9·8
Starch, &c. by difference - - - -	73·3
Oil - - - - - - -	·8
Fibre - - - - -	2·1
Ash - - - - - - -	2·1
Nutrient-ratio - - - -	1 : 7·6
Nutrient-value - - - - -	85

The albuminoids were calculated from the total nitrogen (1·56 per cent.), for a very small amount of this element existed in other combinations. The percentage is about 2 per cent. above that present in average Indian "cleaned" rices, and is even higher than that of Burmese black rice—the richest in that constituent I have yet examined. The mineral matter, which can hardly be adventitious, is thrice as much as is usual in "cleaned" rice. The presence of

the pericarp naturally raises the fibre somewhat. The nutrient-ratio is a very satisfactory one, while the nutrient-value, or sum total in 100 parts, of the several nutrients represents a good food.

6th January 1898.

Pineapple Fibre.

No. 535/3.

(Flying Seal Series, No. 128.) Imperial Institute, London,

Sir, 10th January 1898.

I have the honour to acknowledge the receipt of your letter of the 22nd December last, No. 2851/67 F.S., on the subject of the results of the chemical examination of pineapple fibre received from India which were reported by me to you on the 4th November last. I thank you for the copy of the letter addressed to the Honourable J. Buckingham, of Amguri, which you have been so good as to send me, and shall await with interest his reply to your inquiry.

I have, &c.

F. A. ABEL.

Aconite.

No. 560/3.

(Flying Seal Series, No. 128.) Imperial Institute, London,

Sir, 18th January 1898.

In acknowledging the receipt of your letter of the 30th December 1897, No. 2916/116 F.S., advising me of the despatch of 15 lbs. of dried aconite root, I have to state that we shall be glad to receive the further information promised with regard to this supply, but that Professor Dunstan will no doubt be able to determine, by preliminary examination, whether it consists of the root of *Aconitum Napellus*.

I have, &c.

F. A. ABEL.

Pyinma Wood for Gun-stocks.

No. 563/3.

(Flying Seal Series, No. 129.) Imperial Institute, London,

Sir, 19th January 1898.

With reference to your letter of the 22nd December 1897, No. 2850–165 F.S., I have the honour to inform you that upon its receipt I communicated with the Director-General of Ordnance Factories, inquiring whether the War Office authorities would be prepared to authorise experiments being instituted with the samples of Pyinma timber referred to in your letter as having been specially prepared for purposes of experiment by the Inspector-General of Forests to the Government of India. In reply, he informed me that it would be necessary for him to know in the first instance the specific gravity and the qualities of the Pyinma wood, pointing out that, if its specific gravity were known to exceed ·6, it would be useless to proceed further with experiments on the material; if, however, its specific gravity could not be determined locally, then he would institute preliminary tests with a specimen which should be chosen as thoroughly representative of the wood, and which should be not less than 3 inches thick, and about 4 feet long by 1 foot wide. Should such preliminary experiments prove satisfactory, the next step to be taken would be to supply from India the rough gunstocks, cut from the logs to patterns which he would supply. In reply to this letter I informed the Director-General of Ordnance Factories that experiments had been made with a sample of Pyinma wood for the Scientific Department of the Institute by Professor Unwin, and were published in the Imperial Institute Journal for December 1896. I pointed out that, in Professor Unwin's report, the wood was pronounced to be satisfactory in regard to strength, but its specific gravity was found to be ·669. I inquired of the Director-General whether, under these circumstances, he

would still be willing to undertake experiments with the sample of the wood in question, specially prepared as mentioned in your letter of the 22nd December, and he has just now informed me that he is still willing to test the sample of Pyinma wood, although he entertains the fear that, unless it shows extraordinarily good qualities for the manufacture of gun-stocks, its extra weight would be likely to condemn it.

Under these circumstances I must leave it to the Indian Government authorities to determine whether they consider it advisable to send a sample of the timber prepared by the Inspector-General of Forests of the dimensions specified by Sir William Anderson, and given above. In that case I shall be glad to receive the sample of the wood as soon as possible.

I have, &c.
F. A. ABEL.

B.

From D. Hooper, Esq., and Dr. George Watt, C.I.E., to Sir Frederick Abel, Bart., K.C.B.

India-Rubber.

No. 1704/XVI.—32 F. S.

Indian Museum,
1, Sudder Street, Calcutta,
11th August, 1897.

Sir,

In continuation of this Office letter, No. 1133/XVI.—32, dated the 25th May last, I have the honour to advise the despatch, through the Agent for Government consignments, Calcutta, of a case numbered "14," containing further samples of india-rubber which have been sent to this office from Burma and Assam. I have to request that you will be so good as to favour me with an opinion as to their chemical properties and market value.

2. I beg to add that, on hearing from the Agent, Government Consignments, of its despatch, intimation will be sent to you.

3. Copies of the letters forwarding the samples are appended.

I have, &c.
D. HOOPER.

1. Letter No. 28—56 A 3, dated the 8th April, from the Officiating Conservator of Forests, Eastern Circle, Mandalay, Burma.
2. Letter No. B. 65, dated the 18th May 1897, from the Deputy Conservator of Forests, Darrang Division, Assam.

Sir Frederick A. Abel, Bart, K.C.B.

Enclosure 1 in above.

Copy of a Letter, No. 28—56 A. 3, dated 8th April 1897, from the Officiating Conservator of Forests, Eastern Circle, Mandalay, Burma.

With reference to the correspondence ending with your letter No. 712—32, dated the 31st ultimo, I have the honour to advise despatch to your address, through the Port Officer, one bundle of india-rubber received from the Deputy Conservator of Forests, Katha Division.

Enclosure 2 in above.

Copy of a Letter, No. B. 65, dated 18th May 1897, from the Deputy Conservator of Forests, Darrang Division, Assam.

Under instructions from the Conservator of Forests, Assam, forwarding copy of your No. 1347–32, dated Calcutta, the 11th May 1896, to his address, I have the honour to send five parcels of rubber tapped experimentally in compartment No. 3 of Charduar rubber plantation during February 1897.

2. The botanical specimens in duplicate are also sent as desired. The total weight of the yield of the five trees, immediately after it was brought from the trees, was 4 seers 14 chittacks 1 tola. The weight at the time of despatch is 4 seers 8 chittacks, or the loss in weight by exposure is 6 chittacks 1 tola.

3. Full particulars of tapping are given in the table attached herewith.

Enclosure in above.

Table showing particulars of Tapping of Five Rubber Trees during February 1897.

Compartment No.	Line No.	Tree No.	Tree. Girth.	Tree. Cuts.	Branches. North. Length.	North. Girth.	North. Cuts.	East. Length.	East. Girth.	East. Cuts.	South. Length.	South. Girth.	South. Cuts.	West. Length.	West. Girth.	West. Cuts.	Total Cuts.	Yield. Seer.	Yield. Chittack.	Yield. Tola.	Date of Tapping.	Date on which Rubber collected from Trees.	Remarks.
			Ft. Ins.		Ft. Ins.	Ft. Ins.		Ft. Ins.	Ft. Ins.		Ft. Ins.	Ft. Ins.		Ft. Ins.	Ft. Ins.								
3	8	2	8 9	80	59 6	3 5	16	—	—	—	48 4	3 6	19	32 0	2 8	6	121	1	2	—	20th Feb. 1897.	2nd Mar. 1897.	
3	19	2	6 10	58	37 2	3 3	32	41 6	3 3	48	49 8	2 11	14	36 0	1 10	12	156	—	14	1	Do. -	Do. -	
3	19	8	21 0	138	—	—	—	—	—	—	43 2	3 2	18	42 1	1 10	7	163	—	8	2	Do. -	Do. -	
3	21	14	10 3	127	—	—	—	45 8	2 8	24	38 0	3 1	19	36 4	4 7	40	210	—	15	3	26th Feb. 1897.	1st March 1897.	
3	20	14	11 3	267	41 7	2 6	22	34 8	1 9	1	49 8	4 0	32	—	—	—	322	1	6	—	Do. -	Do. -	
																	Total - - -	4	14	1			

Mudar.

No. 2519/81 F. S.

Indian Museum,
1, Sudder Street, Calcutta,
13th November 1897.

Sir,

With reference to your letter, No. 273/3 (Flying Seal Series, No. 119), dated the 13th September last, I have the honour to thank you for the reports furnished therewith on the results of the chemical examination of the silk cotton (Floss) of *Calotropis procera* by Mr. C. F. Cross, the scientific referee on fibres, and by Mr. C. E. Collyer, the practical expert referee of the Imperial Institute. I have considered it desirable to publish at once the information furnished, and an issue of the Agricultural Ledger dealing with the subject may be expected shortly.

2. With regard to the inquiry made in the concluding paragraph of your letter under reply, I desire to inform you that much difficulty has been experienced in collecting the bark fibre of *Calotropis gigantea*, regarding which I am in correspondence with Madras with the view to obtain 20 lbs. at a probable cost of Rs. 30. Endeavours to procure the bark fibre of *Calotropis procera* have so far proved unsuccessful.

3. I note that the seeds of the silk cotton tree have been handed over to Professor Dunstan for chemical examination. The result will be awaited with interest.

I have, &c.
GEORGE WATT.

Pine-apple Fibre.

No. 2851/67 F. S.

Indian Museum,
1, Sudder Street, Calcutta,
22nd December 1897.

Sir,

I have the honour to acknowledge with thanks the receipt of your letter, No. 347/3 (Flying Seal Series, No. 121), dated the 4th November last, communicating the results of chemical examination of a sample of pine-apple fibre, and of the opinion furnished by the expert referee for fibres of the Imperial Institute, with regard to its quality and value. The sample in question was furnished by the Honourable Mr. J. Buckingham, who obtained it from a small experimental cultivation of the plant at Amgoorie, in Assam.

With reference to the proposal now made for the supply of five tons of the fibre, I have the pleasure to forward herewith an extract from my letter, No. 2738-67, dated the 9th instant, to the address of Mr. Buckingham. My ability to comply with your request for so large a quantity will very greatly, if not entirely, depend on Mr. Buckingham's reply.

I have, &c.
GEORGE WATT.

Enclosure in above.

Extract from Letter, No. 2738-67, dated the 9th December 1897, to the Honourable Mr. J. Buckingham, Amgoorie, Assam.

In continuation of previous correspondence (ending with this office, No. 1606-67, dated the 2nd August 1897), I have now the pleasure of forwarding to you copy of the report just to hand from the Imperial Institute on your sample of pine-apple fibre furnished with yours of the 15th July last. I enclose a very small sample of the fibre as cleaned by the experts of the Institute. You will see that the report is of a most encouraging nature. I shall be glad to hear from you with regard to the proposal to furnish the Institute with five tons of the fibre. I fear that it is beyond your present capability, and that before you could do so it would be necessary to lay out

a fairly large experimental plot. From what I saw of the luxuriant growth of the pineapple in your garden, and, indeed, all over Assam, I should think it highly probable that you may be instrumental in the establishment of a new industry to the province. I should like to have your views on the matter before any further action is taken. The Imperial Institute usually publish in their journal, one month after date of despatch to me, all reports that they furnish. I do not want that report, if possible, to reach India from any other source than my office publication. If you contemplate starting the industry on a large scale, and would rather that publicity was not, however, given to the results so far attained, I shall of course, publish nothing for a time.

* * * * *

Aconite.

No. 2916-116 F. S.

Indian Museum,
1, Sudder Street, Calcutta,
30th December 1897.

Sir,

In continuation of this Office No. 2678 XVI.—116. F.S., dated the 2nd December 1897, I have the honour to inform you that I have despatched in case No. 52 (Invoice No. 43) 15 lbs. of dried aconite root. The root is said to be that of *Aconitum napellus*, but as it came unaccompanied with corresponding botanical samples, I am unable, at present, to say for certain if that be so or not. I have, however, called for botanical specimens accompanied with a further sample of root to be used for comparison, and on these coming to hand, I shall advise you as to the botanical source of the root.

I have, &c.
GEORGE WATT.

Pine-apple Fibre.

No. 3925-67 F.S.

Indian Museum,
1, Sudder Street, Calcutta,
30th December 1897.

Sir,

In continuation of my letter, No. 2851-67 F.S., dated the 22nd December 1897, on the subject of pineapple (*Ananas sativa*) fibre, I have the honour to forward herewith extract from the letter, dated the 18th instant, from Honourable J. Buckingham, C.I.E., of Amgoorie, Assam, for your information, and to add that although some delay must necessarily occur, it may be expected Mr. Buckingham will ultimately fulfil his engagement.

I have, &c.
GEORGE WATT.

Enclosure in above.

Extract from Letter, dated 18th December 1897, from the Honourable J. Buckingham, C.I.E., Amgoorie, Assam.

I am much obliged to you for your letter of the 9th instant, regarding pineapple fibre; it is very satisfactory to learn that the fibre is so well reported on. As you observe, it is out of the question getting any quantity now, as the plant must be grown especially for fibre, and not fruit; it is necessary to grow the plants in shade, and the fruit, under such influence, is practically nil.

I shall at once lay out about five acres as an experimental plot. I have enough plants now for at least three acres.

I am much obliged for the help you have given me in this. By all means publish whatever you think fit about the fibre.

* * * * *

Mudar.

No. 243/81 F. S.

Indian Musuem,
1, Sudder Street, Calcutta,
7th February 1898.

Sir,

In continuation of this Office No. 2519—81 F. S., dated the 13th November 1897, I have now the honour to advise you that a sample of the bark fibre of *Calotropis gigantea* (weighing 8 lbs.) has been forwarded to Mr. Royle, from which a portion will be supplied to the Research Department. You may recollect that you asked for this fibre by your Flying Seal Series, No. 28, of the 17th July 1894. The subsequent correspondence explained the delay as due to the difficulty to procure the fibre. While well known to afford a valuable bark fibre, *Calotropis gigantea* is almost exclusively valued for its silk floss. Indeed the greatest difficulty has been experienced to induce any one to supply the quantity of bark fibre required, and even now we have only been able to secure a very small sample. You will understand from these circumstances that it is hardly likely to assume importance, but to complete the investigations that your Scientific Department has already far advanced and is still engaged upon, I shall feel obliged if you can furnish me with a report on the sample now supplied.

I have, &c.
GEORGE WATT.

Sophlang.

No. 402—147. F. S.

Indian Museum,
1, Sudder Street, Calcutta,
24th February 1898.

Sir,

I have the honour to inform you that I am forwarding, with the next consignment, 5 lb. of an edible tuber (*Flemingia vestita*) locally known as "Sophlang" in the Khasia and Jaintia Hills, Assam, where it is regularly cultivated and a large trade carried on. I beg to add that I should be glad if Professor Church could see his way to examine and report on the tuber.

I have, &c.
GEORGE WATT.

Pyinma Wood for Gun Stocks.

No. 452/169 F. S.

Indian Museum,
1, Sudder Street, Calcutta,
3rd March 1898.

Sir,

I have the honour to acknowledge the receipt of your letter, Flying Seal Series No. 129, dated the 19th January 1898, by which you communicate to this Office the result of your reference to the War Office in the matter of "Pyinma" timber (*Lagerstræmia Flos-Reginæ*) as a suitable wood for the manufacture of rifle stocks.

In reply, I beg to enclose herewith copy of correspondence between the Inspector-General of Forests to the Government of India and this Office, from which it will be seen that the Inspector-General of Forests has decided to furnish a log of the dimensions named in your letter under acknowledgment and has directed the Conservator of Forests, Rangoon, to select the same and forward to your address direct.

I have, &c.
GEORGE WATT.

Enclosure 1 in above.

Copy of a Letter No. 255—169, dated the 9th February 1898, to the Inspector-General of Forests to the Government of India, Calcutta.

With reference to your letter No. 976, dated the 13th October 1897, on the subject of Pyinma wood for trial for gun stocks, I have the honour to forward in original the reply just to hand by this mail. I shall be glad if you will do me the favour to return the letter at your earliest convenience as it has to be printed along with the other papers.

Should you decide to comply with the conditions laid down and, under the somewhat doubtful circumstances named, to furnish samples, I shall advise Sir Frederick A. Abel as you may direct, and perhaps the samples might be forwarded direct by the local Conservator of Forests.

If it would be a convenience to you, I shall be happy to furnish a few copies of the printed correspondence when prepared for issue to the Indian Committee at the Imperial Institute.

Enclosure 2 in above.

No. 170, dated Calcutta, the 18th February 1898.

From B. Ribbentrop, Esq., C.I.E., Inspector-General of Forests to the Government of India, to the Conservator of Forests, Pegu Circle, Lower Burma.

In continuation of my letter No. 1074, dated the 9th December last, I have the honour to request that you will be good enough to select from the eighteen seasoned logs of Pyinma wood that are lying stored in the Forest Department's timber depôt at Rangoon, a log without any flaws in it, and that you will forward it direct to the address noted in the margin.* The log sent should be thoroughly representative of the best qualities of the wood, and should be of sufficient dimensions to yield a good plank, 4 ft. × 1 ft. × 3 ins. The date of despatch should be duly reported to this office.

* Sir F. A. Abel, K.C.B.,
Honorary Secretary and Director,
Imperial Institute,
London.

CORRESPONDENCE between the INDIA OFFICE, the GOVERNMENT OF INDIA, and the IMPERIAL INSTITUTE.

No. 1.

Letter from Sir Frederick Abel to Sir Steuart Bayley, K.C.S.I., C.I.E.

Imperial Institute Road,
London, S.W., 3rd March 1897.

My Dear Sir Steuart Bayley,

Referring to the suggestion included in the Quarterly Report of Professor Dunstan of 7th January last, that a grant of money might be made to defray the expenses of the proposed inquiry into the constituents of Indian hemp, I would not desire that any action taken by the Committee upon this suggestion should take the form of a proposal that the grant of money (100*l.*) made towards defraying the cost of experimental work in the Scientific Department here, by the Government of India, and fixed to be continued for a period of five years, should be increased, at any rate, for the present, but that any means provided for carrying out the particular work referred to should be in the form of a special grant for that purpose.

At the same time it is right that I should point out that the 100*l.* grant goes a very small way indeed towards covering the expenditure incurred by the Imperial Institute in carrying out the large amount of experimental work, in connection with natural products of India, in the Scientific Department. That such is the case is demonstrated by the following statement, showing the

the various inquiries which are now being conducted in the laboratories of the Institute. These are as follow:—

1. A systematic examination of Indian tanning materials.
2. Examination of jute and other Indian fibres.
3. Investigation of the constituents and medicinal value of the Indian Aconites.
4. Investigation of the constituents and medicinal value of Indian Podophyllum.
5. Examination of various Indian gums.
6. Examination of Indian tobacco.
7. Systematic investigation into the cause of the variations in the quality of Indian opium, involving analyses of samples of opium from each of the opium districts in India.
8. Analyses and practical tests of Indian Coals.

These inquiries take up the entire time of eight skilled assistants, who are engaged under the direction of Professor Dunstan in conducting the requisite analyses and other experimental work. These assistants receive stipends amounting in all to a total of 550*l.* per annum. This sum does not include the expenses of apparatus and materials required in the investigations, nor does it include that incurred for menial service.

The grant of 100*l.* scarcely suffices to cover the outlay incurred in the provision of apparatus and materials (chemicals, &c.) required for carrying out the foregoing investigations.

I should also point out that, in addition to the expenditure involved in the inquiries in progress, as shown in the above statement, a considerable proportion of the time of the Director of the Scientific Department, whose salary is at present 700*l.* per annum, is occupied in superintending this experimental work, and deducing results therefrom.

As Indian hemp was referred to a special Commission appointed to inquire into the cultivation of the plant, the proportion of drugs therefrom, &c., and as important evidence fully demonstrated the necessity for extended chemical examination, with a view to determine the causes of very great variations in the character of preparations made from the hemp plant, and other matters bearing upon their utilization, &c. it occurred to me that the Government of India might desire to afford facilities for the speedy carrying out of this special inquiry. Should this not be considered desirable, the work must of course be postponed until the many other inquiries now on hand for the Indian Government in the Scientific Department have been disposed of.

I have, &c.,
F. A. ABEL.

No. 2.

Revenue Despatch, No. 66, from the Secretary of State for India to the Government of India.

India Office,
29th April 1897.

My Lord,

I forward herewith, for such action as you may be pleased to take in the matter, a copy of a letter, and its enclosure, received from the Sub-Committee of the Indian Section of the Imperial Institute, having reference to the suggestion made in Professor Dunstan's Report of the 7th January last, already forwarded to you, that a special grant should be provided to defray the cost of the inquiry to be made, at the request of the Government of India, into the constituents of Indian hemp. Sir Frederick Abel leaves it to the Government of India to fix the amount of the additional sum, if any, to be allowed for the purpose.

2. I should have preferred that any application of this kind should be deferred until the question of the annual grant to the Imperial Institute for research work was again brought under consideration in 1900; but I understand that in the opinion of the Sub-Committee, which is responsible for the proper administration of the Indian Section of the Imperial Institute, the work which is being done in the Research Department of the Imperial Institute for the Government of India is worth considerably more than the

subsidy actually paid; and your Excellency will observe that the Sub-Committee desire to recommend Professor Dunstan's suggestion as supported by Sir Frederick Abel, to the favourable consideration of the Government of India.

I am, &c.,
GEORGE HAMILTON.

No. 3.

Revenue and Agricultural Despatch, No. 45, from the Government of India to the Secretary of State for India.

Simla,
29th June 1897.

My Lord,

We have the honour to acknowledge the receipt of your Despatch, No. 37, Revenue, dated 25th February 1897, with which were forwarded copies of the Minutes of Proceedings of the Sub-Committee of the Indian Section of the Imperial Institute, together with copies of Mr. Royle's and Professor Dunstan's Reports for the quarter ending the 31st December 1896.

2. We desire in the first place to offer certain remarks on paragraph 46 of the Minutes of the Indian Sub-Committee meeting of the 15th October 1896, which deals with the question of correspondence. We would invite your Lordship's attention to paragraph 4 of our Despatch No. 57, dated 23rd October 1895, in which we made it a condition that the Curator of our collections of Indian Economic Products in the Imperial Institute should be the official repository of all information regarding these collections, and to paragraph 7 of Sir Frederick Abel's memorandum, dated 10th March 1896, in which he accepted our condition. The reason why we lay such stress upon this point is that we believe that unless the information regarding any product and the sample of the product which forms part of our collection can be consulted side by side, the value of each is in great part destroyed; and we therefore consider it essential that the two should be in charge of the same person. For this reason we did not intend, in our Despatch No. 37, dated 7th July 1896, to propose that correspondence connected with *commercial* inquiry and intelligence should be conducted direct with the Secretary of the Institute. The results of such inquiry are embodied in the correspondence itself; and we do not understand how, unless such correspondence, or at any rate a copy of it, is to be deposited with our Curator, he can possibly be the repository of the information which it contains. We think, therefore, that all correspondence regarding commercial inquiry should be in the hands of the Secretary to the Sub-Committee, and, so far as we are concerned, should be conducted by him under the orders of the Sub-Committee; while in the case of commercial inquiry conducted in England by the authorities of the Institute, copies of the correspondence should invariably be communicated to the Sub-Committee for deposit with the Curator. We desire to make it clear that we do not propose that commercial inquiry should be *conducted* in England by our Curator; but we do desire that the correspondence in which such inquiry is conducted should be deposited, as either originals or copies, with our Curator, so as to be available for reference alongside of the collection to which it refers.

3. As regards *scientific* research, the position appears to us to be somewhat different. In that case an elaborate inquiry is carried out by a distinct staff, with the stages of which we are in no way concerned; and it is only the definite results obtained that are of commercial or economic value, and as such should be communicated to our Curator. Thus, in principle, we have no objection to direct correspondence between the authorities of the Institute and our Reporter on Economic Products so far as scientific research is concerned. In practice, however, the distinction is found to be inconvenient, and to greatly add to the work of the office of our reporter. It is not always easy to keep the two subjects entirely distinct, so that the same letter often has to be addressed in duplicate to Sir Frederick Abel and to Mr. Royle.

4. The fundamental principle of our system is, that *all* economic products sent from India to England, whether for exhibition only, for commercial inquiry, or for scientific research, should be represented by samples, both in

our collection at the Imperial Institute and in our duplicate collection at Calcutta. This we regard as of primary importance, since much of the uncertainty regarding Indian products has sprung from the difficulty of identifying the precise substance regarding which information has been recorded in the past. The result is that all correspondence regarding the supply of material for scientific examination must necessarily involve concurrent correspondence regarding the addition of the same material to our collections. It would therefore be convenient if the arrangements set forth in paragraph 3 of our Despatch No. 37, dated 7th July 1896, were so far modified as to allow of all our correspondence on the subject of material sent home being addressed in the first instance to the Secretary to the Sub-Committee, who would pass on so much of it as regarded scientific research to the Secretary of the Institute. This is, however, a mere matter of convenience and economy of labour; and we have no wish to press it if the authorities of the Institute have any objection to the proposal.

5. With regard to direct correspondence between the Imperial Institute and Local Governments, we agree with the Sub-Committee that such an arrangement endangers the principle set forth in paragraph 4 above. The same remark applies, moreover, to direct requisitions for materials by the Institute to firms in India, such as the Bengal Iron and Steel Company; and we would suggest that it be made an invariable rule subject to no exception whatever, that all Indian materials required for examination or inquiry should be obtained through the Reporter on Economic Products, who will thus have an opportunity of depositing specimens in the London and Calcutta collections. We trust that it will be understood that it is in no spirit of jealousy that we make this proposal, nor from any desire to hamper the Institute in the conduct of their inquiries. On the contrary, it is our object, and to our advantage, to assist them in extending those inquiries as widely as possible. But, in view of past experience, we regard it as of cardinal importance that samples of every material examined should be placed on record for future reference and identification, in India as well as in England; and the agency provided by us for that purpose is the only means by which that end can possibly be secured.

6. With reference to paragraph 3 of your Lordship's despatch under reply, we have the honour to inform you that we are addressing you separately, in our Despatch No. 46 of this date, in regard to the examination of Indian opium; that we have already addressed you in regard to turpentine in our Despatch No. 371, Finance, dated 30th December 1896; and that the subject is receiving our attention. If the Imperial Institute authorities will address the Reporter on Economic Products in ordinary course regarding a supply of material for the examination of Indian hemp, their requisition will be promptly complied with.

We have, &c.,

ELGIN.
G. S. WHITE.
J. WOODBURN.
M. D. CHALMERS.
E. H. H. COLLEN.
A. C. TREVOR.

LIBRARY OF THE BOMBAY BRANCH OF THE ROYAL ASIATIC SOCIETY

REPORT FOR 1898-99.

1898-99.

From the CHAIRMAN of the SPECIAL SUB-COMMITTEE of the INDIAN SECTION of the IMPERIAL INSTITUTE to the UNDER SECRETARY OF STATE FOR INDIA.

India Office, S.W.,
April 1899.

SIR,

As Chairman of the Sub-Committee of the Indian Section of the Imperial Institute, I have, in accordance with the India Office letter of the 13th November 1896, the honour to submit, for the information of the Secretary of State for India in Council and for communication to the Government of India, the accompanying Reports on the Administration of the Section during 1898-9.

The Curator's Report shows that during the year 1,032 new specimens of Indian productions were added to the collections, raising the total number of natural and manufactured articles exhibited in the galleries of the Section (and duplicated in the Trade Samples Stores) to 10,742. The galleries are now beginning to appear crowded, and before long more room will have to be provided for their special contents, and it has been suggested that this may probably best be done by transferring the Industrial Art Collections, in the Pavilion attached to these galleries, to the South Kensington Museum, and extending the collections of raw products and primary and secondary manufactures into the Pavilion.

Collections of Indian raw vegetable products were presented during the year under review to Dr. A. W. Munthe, of the Merchants' School of Commerce, Stockholm, and to Professor Leech, of Owen's College, Manchester; and both have given complete satisfaction. During the year 288 samples were issued from the Indian Section to the Scientific Department, and outside experts, on many of which reports have been received and duly forwarded to the Government of India. The inquiries addressed by merchants and manufacturers to the Curator during the year show an increase in both interest and importance.

Professor Wyndham Dunstan's Report on the work done during the year in the Scientific and Technical Department of the Imperial Institute for the Government of India is again of the highest value. I would draw particular attention to the investigations of Indian Podophyllum and of 132 samples of edible oils derived from 26 different species of seeds given in Appendices G and H to his Report. Full accounts of these two important investigations have been published respectively in the Journal of the Chemical Society and in the Journal of the Society of Chemical Industry.

It is desirable, in the interests of India, that information of this character should receive the widest circulation; and I agree with Sir George Birdwood's remark in para. 15 of his Report, that it must soon become a serious question as to what steps should be taken both here and in India for extending the utilisation of Professor Wyndham Dunstan's Reports on Indian Natural Products.

Mr. Royle, the Curator, has been granted leave on medical certificate for five months, and Sir G. Birdwood has very kindly undertaken to perform his duties gratuitously for the present. The Committee have already recorded their sense of Sir G. Birdwood's great kindness in solving what would otherwise have been a real difficulty, as the funds at the Committee's disposal hardly allow of an efficient paid substitute being obtained.

It gives me pleasure in conclusion to note the cordial terms of appreciation in which Sir George Birdwood is able to speak of the work done in the Indian Section of the Imperial Institute by Mr. Royle and his subordinates.

I have, &c.
S. C. BAYLEY.

IMPERIAL INSTITUTE.

INDIAN SECTION.

REPORT for the Year ending the 31st March 1899.

I have the honour to submit the following Report on the work done in the Indian Section of the Imperial Institute during the 12 months ending 31st March 1899.

2. *Indian Section Committee.*—The under-mentioned official, home on leave from India, has been added to the Committee as an honorary member, viz., Dr. George Watt, M.B., C.M., C.I.E.

3. *Meetings held.*—During the year the Committee has held nine meetings. The detailed minutes of the meetings are printed at the end of this Report.*

4. *Work done in connexion with the Collections.*—During the past year 63 cases, containing 1,032 new specimens, have been received from India. These cases have been unpacked, and their contents were prepared for exhibition and storage immediately after their arrival. Appendix (A) shows the distribution of the new specimens received in their economic groups, and also the total number of specimens (10,742) now contained in the collections.

5. *New Show-cases.*—Two new show-cases, one for additional drugs, and one for lac and lac-ware, have been added to the Indian Section.

6. *Crowded condition of the Collections.*—The space allotted to India for exhibition purposes has now become so crowded that the addition of any more cases to it, of the size hitherto used, will seriously block the section. This is a matter for consideration, and will have to be discussed with the authorities of the Imperial Institute, so soon as their pending negotiations with the University of London have been brought to an issue. A solution will possibly be provided by transferring the industrial art collection from the Indian Pavilion to the Indian Section of the South Kensington Museum, and extending the economic collection into the Pavilion.

7. *Work done in the Indian Pavilion.*—The brass and silver-ware in the Indian Pavilion have been thoroughly cleaned; the arms mounted on the large shield have been cleaned and re-lacquered; the carved screens have been re-lined, and sun-blinds have been erected over the textile fabric cases (principally silk). The necessity for replacing, at an early date, some of the least air-tight and dust-proof old show-cases by new cases of a better type is evident; the textile fabrics are showing signs of deterioration owing to the unsuitable nature of the old cases in which they are exhibited.

8. *Work done in Samples Store-room.*—Two double storage-racks and a cupboard have been added to the samples store-room. There is now no further storage accommodation there, and only a very limited space for the unpacking of cases, &c. I contemplate, therefore, when the proper opportunity arises, having to submit a proposal for arranging with Sir Frederick Abel for the transfer of the Indian store samples to the vaults under the East Conference Room.

9. *Office Fittings.*—Several pigeon-holed office fittings have been constructed to contain and facilitate reference to the Handbooks, Agricultural Ledgers, and other works kept in the Indian Section for the use of inquirers.

10. *Collections supplied from the Indian Section to Public Institutions, Museums and Schools.*—(*a.*) Dr. A. W. Munthe, of the "Merchants' School of Commerce," Stockholm, having applied for a collection of Indian raw vegetable products, and his application having been approved by the Committee, a collection containing 153 specimens was sent to his address.

An official letter of thanks from the Board of Directors has been received.

(*b.*) Professor Leech, of Owens College, Manchester, having applied for specimens of Indian *Materia Medica*, and his application having been

* NOTE.—The Minutes are not reprinted with the present Papers.

approved by the Committee, a collection of 275 specimens of drugs was sent to him.

A letter of personal thanks has been received from Professor Leech, in which he mentions that an official letter conveying the thanks of the committee of the college will be despatched after their next meeting.

11. *Samples issued to the Scientific Department of the Imperial Institute and to Outside Experts.*—During the year the issue of samples for examination or valuation by the Scientific Department of the Imperial Institute, or by outside experts, has been continued.

The following have been the principal samples issued, viz.:—

Economic Group.	No. of Samples issued.
Food substances	41
Oils and oil-seeds	107
Medicines	15
Gums and resins	28
Dyes and tans	48
Fibres	23
Minerals	26
Total	288

Reports on many of these samples have been prepared in the Scientific Department and forwarded to India.

12. *Expenditure.*—The expenditure on the Indian Section during the year 1897–8, not having been reported to the Committee until April 1898, was not included in the last Annual Report, which was for the period ending 31st March 1898. The total amount of expenditure on the Imperial Institute for that year was the same as the grant, viz.:—

	£
On Indian Section	550
Annual grant for general purposes of Institute	750
,, ,, scientific investigation	100
Curator	500
	1,900

Similar amounts were granted for the year ending 31st March 1899, and the expenditure was again the same as the grant.

13. *Commercial and General Inquiries.*—There have been signs during the past year that the usefulness of the Indian Section as a channel through which inquiries can be answered, or supplies of products procured from India, is beginning to be more widely recognised.

Some of the most interesting inquiries have been :—

(*a.*) An application from a gentleman for full information concerning the cultivation of Sisal hemp, which he desires to grow on his property in Tirhoot; much information has been obtained for him from Dr. Watt's Department and from the Commercial Intelligence Department; he has been supplied with young Sisal hemp plants from the Botanic Gardens, Saharanpur, and they are understood to be thriving; he is now also trying to introduce the Mauritius hemp.

(*b.*) A firm of New Zealand merchants wish to be put into communication with Indian firms willing to export linseed oil and castor oil to New Zealand; the matter is now being dealt with by Dr. Watt's Department.

(*c.*) A London firm of brokers invite communications from Indian cultivators willing to supply rhea ribbons; samples of rhea and aloe fibres have been received from Indian planters, and these have been reported on in an encouraging way; and larger samples have been asked for.

(*d.*) Dr. Watt reported that a planter in India was desirous of attempting the cultivation of vanilla, and wanted information concerning its

management in the Seychelles; details were obtained through the Commercial Intelligence Department, and forwarded to him by the Curator.

(*e.*) A large Yorkshire firm has been engaged in a preliminary examination of samples of Indian gums with which the Curator has supplied them. They have since asked if they can be supplied with a much larger quantity of several varieties in order to make practical tests, and they anticipate being able to give large orders if the gums they select can be procured at a suitable price.

(*f.*) An architect engaged in the erection of a large hall, of Indian design, in connexion with a country mansion, wishes to use as far as possible Indian materials and workmanship on it. He has sent a long list of quantities and dimensions of white marble columns, arches, and pannelling, which the Curator has forwarded to India, in order to see if any responsible person will undertake to carry out a contract for supplying and shipping the material.

(*g.*) A large order for Belgaum walnut oil (*Aleurites moluccana*) from a Russian merchant, who is likely to require still further quantities in the future, has had to be sent to Ceylon, because the Ceylon collection contained samples of this oil (known in Ceylon as Kekuna oil) whereas the Indian collection had none.

Ceylon can, however, only supply a very limited quantity yearly, and India has been asked to supply samples and quotations as early as possible.

14. *Correspondence with the Reporter on Economic Products to the Government of India.*—Correspondence passes regularly between the Reporter on Economic Products and the Secretary to the Indian Sub-Committee on matters connected with the collections. Correspondence under "Flying Seal" also passes between the Reporter on Economic Products and the Honorary Secretary and Director, Imperial Institute. A list of the Flying Seal correspondence is appended (Appendix B) and a selection of the more important Flying Seal letters is printed on pp. 150 to 161 of present reprint.

15. *Professor Dunstan's Annual Report.*—Professor Wyndham Dunstan's Report on the work done for India in the Scientific and Technical Department of the Imperial Institute, with Sir Frederick Abel's covering letter, will be found in the final Appendix to this Report. I would draw attention to the observations with which Professor Wyndham Dunstan concludes his report, and to the emphasis given to them in the third paragraph of Sir Frederick Abel's covering letter. For my own part, I would put no restrictions on the measures which have been followed by Dr. Watt with such success during the past 10 years, for securing a completely representative collection at the Imperial Institute of the natural productions of India which are, or are likely to prove, of economic value, for a practically exhaustive collection of the sort provides the proper scientific basis for the progressive technical investigations for which these collections have been so laboriously and carefully provided by the Government of India.

But in view of the highly important and invaluable reports received from Professor Wyndham Dunstan during the past three years, the question arises, and will soon become pressing, as to what measures should be taken both here and in India, for accelerating and extending the utilisation of the results obtained from the examination of Indian products in the Scientific Department of the Imperial Institute.

16. *Concluding Remarks.*—I would add, in conclusion, that the intimate experience I have had during the past two months of the Indian Section has deeply impressed me with a sense of the admirable manner in which the exhibition of the collections in the public galleries, and the deposit of them in the samples store room has been organised by Mr. Royle. Nothing indeed could be more thoroughly practical or more effective. I am also able to speak in the highest terms of the efficiency of the subordinate clerical and technical staff, and in this respect desire to particularly mention the names of Mr. George Aston and Mr. Foster.

GEORGE BIRDWOOD.

April 1899.

FINANCIAL STATEMENT.

Estimated Expenses for the Year 1899–1900.

	£ s. d.	£ s. d.
Heading A.—Salaries of Curator's Staff:—		
1 Clerk at 80*l.* (rising to 100*l.*)	80 0 0	
Senior Attendant at 36*s.* weekly (rising to 38*s.*)	93 12 0	
Junior Attendant at 30*s.* weekly (rising to 32*s.*)	78 0 0	
Boy Messenger and Writer at 12*s.* 6*d.* (rising to 15*s.*)	32 10 0	
Occasional extra help	5 18 0	
		290 0 0
Heading B.—General Expenses of Indian Section:—		
Petty Cash at 5*l.* monthly		60 0 0
Tins, Bottles, Jars, &c., for specimens	13 0 0	
Two new show-cases	64 0 0	
Re-polishing show-cases	10 0 0	
Cleaning and re-lacquering brassware	8 0 0	
Carpenters' and painters' general work	15 0 0	
Spirits of wine, paint, varnish, cleaning materials	10 0 0	
		120 0 0
Tins for storage of surplus samples	7 10 0	
New storage rack and storeroom fittings	25 0 0	
		32 10 0
Office fittings		5 0 0
Margin for contingencies		42 10 0
Totals of Headings A. and B.		£550 0 0

Any savings from one item to be available for others.

Heading C.—Contributions to Imperial Institute:—	
Annual Grant for general purposes, Institute	750 0 0
Annual Grant for Scientific Investigation	100 0 0
Heading D.—Curator and Assistant Curator:—	
Curator	500 0 0
Assistant Curator. (*Appointment in abeyance*)	—
Total	£1,900 0 0

APPENDICES to Sir GEORGE BIRDWOOD'S Report.

APPENDIX A.

Statement showing Number of Specimens received in Indian Section between 1st April 1898 and 31st March 1899.

Name of Group.	No. of Specimens.
Dyes and Tans	256
Gums and Resins	70
Food Stuffs	43
Oils and Oil-seeds	81
Fibres	22
Miscellaneous Index Collection	366
Textile Fabrics	94
Total number of exhibits received since 31st March 1898	1,032
Total number of cases received since 1st April 1898	63

Remarks.	
Number of specimens received 31st March 1898	9,781
Number of specimens received during the current year	1,032
	10,813
Number of old specimens eliminated from the collection	71
Total number of specimens received	10,742

APPENDIX B.

Correspondence under Flying Seal since April 1898, between Sir Frederick Abel, Honorary Secretary and Director of the Imperial Institute, and Dr. Watt.

(1.) Letters from Sir F. Abel to Dr. Watt.

Date.	Subject.
1898.	
May 3	Stating that Coal Report has been sent.
„ 10	Enclosing paper on *Delphinium Zalil* by Messrs. Perkin and Pilgrim.
„ 17	Stating that Ban Riha fibre shall be examined.
„ 17	Acknowledging letter of 28th April *re* food grains.
„ 24	Acknowledging receipt of opium alkaloids.
June 1	Stating that Kino shall be examined.
„ 7	Enclosing memorandum by Professor Church on nutritive value of bran.
„ 14	Enclosing report on sample of Malabar Kino.
„ 14	Stating that a report on *Hyoscyamus muticus* will soon be sent.
„ 20	Acknowledging statement *re* preparation of oils.
„ 30	Delay in transmission of coal report.
July 7	Enclosing papers on Podophyllum.
„ 19	Enclosing report by Professor Church on five food grains.
„ 27	Acknowledging receipt of 1½ lbs. of kino.
Sept. 30	Enclosing report on Pyinma wood for gunstocks.
Oct. 7	Enclosing report by Professor Church on four food grains.
„ 20	Enclosing report on *Calotropis gigantea* and Ban Riha fibres.
1898.	
Oct. 26	Stating that Professors Hummel and Perkin will examine *Onosma echioides* and *Baccaurea sapida*.
Nov. 11	Enclosing report by Professor Church on Raji tailings.
„ 16	Enclosing memoir on Aconites and a paper on Podophyllum.
„ 17	Enclosing memorandum on *Tacca* and Sabai fibres.
„ 23	Enclosing report on Edible oils.
Dec. 1	Enclosing report on *Hyoscyamus muticus*.
„ 1	Stating that a report on Jeypore mica will be obtained.
„ 19	Acknowledging letter *re* error in Coal Invoice.
„ 21	Enclosing memorandum *re* supply of coconut fibre.
1899.	
Jan. 10	Enclosing report on Para and Ceara rubbers.
„ 17	Stating that *Butea frondosa* and *Calotropis gigantea* fibres shall be examined.
Feb. 3	Enclosing a report on samples of mica from Jeypore.
„ 3	Enclosing reprint of a paper on *Hyoscyamus muticus*.
„ 7	Enclosing report on a sample of rubber from Assam.

(2.) Letters from Dr. Watt.

Date.	Subject.
1898.	
Feb. 24	Advice of *Gossypium herbaceum* flowers.
April 5	Delay in receipt of coal report.
„ 28	Advice of four food grains used in famine.
„ 29	Advice of sample of true Kino from Malabar.
May 26	Asking when report on *Hyoscyamus* may be expected.
„ 19	Asking for analysis of Raji tailings.
„ 5	Advice of opium alkaloids.
April 19	Acknowledging letter of 11th March, F.S. 133.
„ 28	Asking for examination of Ban Riha fibre.
June 9	Advice of Ban Riha fibre.
„ 8	Delay in transmission of coal report.
„ 9	Four famine food grains referred to above.
„ 9	Acknowledging report on *Delphinium Zalil*.
„ 9	Enclosing invoices of and information *re* Indian oils.
July 7	Advice of sample of Raji.
„ 7	Acknowledging letter, No. 144, *re* Kino, and advice of further sample.
„ 7	Acknowledging report on sample of Kino.
„ 21	Trial cultivation of Moorva fibre.
„ 4	Acknowledging report and paper on *Podophyllum Emodi*.
Aug. 24	Asking for a report on a sample of Para rubber.
Sept. 29	Asking for a report on a sample of Assam rubber.
„ 29	Asking for a report on the bark of *Baccaurea sapida*.
1898.	
Sept. 29	Asking for a report on the roots of *Onosma echioides*.
Aug. 25	Acknowledging report on food grains of 19th July.
Nov. 8	Asking for report on samples of Jeypore mica.
„ 2	Acknowledging report on four Indian food grains.
„ 17	Acknowledging report on fibres of *Calotropis gigantea* and Ban Riha.
Dec. 8	Acknowledging report on Raji tailings.
„ 1	Errors in coal report.
„ 15	Acknowledging memorandum *re* Sabai and *Tacca* fibres.
„ 8	Acknowledging papers on Aconites and Podophyllum.
„ 15	Acknowledging report on Indian edible oils.
„ 21	Acknowledging report on *Hyoscyamus muticus*.
„ 20	Advice of 2 lbs. of *Agave* fibre for report.
„ 29	Advice of kernels of *Thevetia neriifolia* for examination.
„ 29	Advice of fibres of *Calotropis gigantea* and *Butea frondosa*.
1899.	
Jan. 18	Acknowledging memorandum *re* supply of coconut fibre.
Feb. 9	Acknowledging report on Para and Ceara rubbers.
„ 2	"Pyinma" gunstocks for Paris Exhibition.

IMPERIAL INSTITUTE.

SCIENTIFIC AND TECHNICAL DEPARTMENT.

LETTER from the DIRECTOR and SECRETARY of the IMPERIAL INSTITUTE to Sir STEUART C. BAYLEY, K.C.S.I., C.I.E.

Imperial Institute, London,
16th March 1899.

Sir,

In submitting to the Special Committee for the Indian Section of the Imperial Institute the Report of the Director of the Scientific and Technical Department on the work accomplished for the Government of India during the year 1898-99, which includes valuable researches on Indian food-stuffs carried out by one of the Scientific Referees to the Institute (Professor A. H. Church, M.A., F.R.S.), I beg leave strongly to endorse the observation made by Professor Dunstan, in deprecation of the view expressed by the Reporter on Economic Products, that it is undesirable to proceed at once with the collection of materials for purposes of chemical and technical examination, which appear not unlikely to lead to the establishment of new sources of rubber, or of rubber-like substances.

The continuous increase in the demand for rubber, consequent upon the development and large extension of its industrial applications, and the rapid advances made in the provision of supplies from other countries, are, I submit, very obvious reasons why, in the commercial interests of India, this subject should be vigorously pursued with the least possible delay.

And these observations lead me to urge, as forcibly as I can, in support of Professor Dunstan's representations regarding the adoption of all practical measures for accelerating the commercial utilisation of the results obtained in the scientific investigation of natural products from India, which are carried out at the Imperial Institute.

I venture to consider that persevering energies devoted to this subject are of more immediate value to India than the organisation and pursuit of measures for securing a complete representation, by the collections at the Imperial Institute and at Calcutta, of natural products, and of the occurrence of one and the same product in different parts of the Empire, however interesting and desirable it may be from a scientific point of view to advance the latter result.

It appears to me also, in view of the vast field for research presented by India's natural products, that, before selecting from among them materials for investigation, with a view to the attainments of results likely to prove of commercial and industrial importance, it should be ascertained, by the collection of reliable information, to what probable extent supplies of such materials are likely to be procurable, and whether facilities exist for rendering such supplies properly available for commercial purposes.

I have, &c.
F. A. ABEL.

Enclosure to foregoing.

Report by the Director, Professor Wyndham R. Dunstan, M.A., F.R.S., Sec. C.S., on Investigations conducted for the Government of India during the year ending 1st April 1899.

During the past year the investigations of Indian products referred to in my Annual Report for the year ending 1st April 1898, have been continued and in several cases brought to a conclusion, whilst a number of new inquiries have been started. These have already been referred to in my Quarterly Reports for the present year, and especially in that dated January 1899. It

will be convenient here to briefly summarise that important work which has been completed, and to refer to that in progress.

Indian Fibres.—A report has been made on the commercial value of the fibres of *Calotropis gigantea* (Madar) from Madras and of *Villebrunea integrifolia* (Ban Riha) from Assam (*see* Appendix D). Ban Riha fibre has given promising results which indicate that it may ultimately prove to be superior to the fibre known as China grass. A further investigation of the merits of this fibre will be made as soon as the additional supply asked for has been received.

Through an inquiry made by the representative of one of the largest cocoanut fibre manufactories in the United States it is possible that a considerable trade may be opened for this fibre in Madras. The matter has already been referred to the Reporter on Economic Products, who is to supply further information. (*See* Appendix E.)

An examination has been made of a specimen of "Sabai" fibre, *Ischæmum angustifolium*, forwarded from Poona, and a request from a broker, for samples of *Tacca* fibre produced in India, with a view to obtaining a regular supply for the English market, has been referred to the Reporter on Economic Products. (Appendix F.)

Indian Oils.—The large collection of edible oils referred to in a previous report has now been examined. The investigation was undertaken by Dr. Crossley and Mr. Le Sueur in my laboratory at St. Thomas's Hospital, as the whole of the staff of the Scientific and Technical Department were occupied with other inquiries. A general report on the results obtained has been forwarded to India (Appendix G), whilst a detailed account of the inquiry has been given by Dr. Crossley and Mr. Le Sueur to the Society of Chemical Industry, the paper being printed in the Journal of that Society (November 1898). It is probable, now that the characters of these oils have been precisely defined, that the attention of users of such oils in this country may be directed to the merits which many of them undoubtedly possess.

Indian Medicinal Plants.—The further examination of the nature of the alkaloids contained in the various Indian aconites has been actively proceeded with, and a number of important and interesting results have been obtained, which will shortly be made the subject of a special report. A paper, which is part of the outcome of our previous investigations of this subject, has been presented to the Royal Society, and printed in the "Philosophical Transactions." ("The Pharmacology of Aconitine, Diacetylaconitine, Benzaconine, and "Aconine, considered in relation to their Chemical Constitution," by Professors Cash and Dunstan, Phil. Trans., 1898.) A reprint of this paper has been forwarded to India, as it contains the record of a number of results which are likely to be of value to those who are interested in the medicinal employment of aconite.

As mentioned in my last Annual Report, the chemical investigation of the constituents of Indian Podophyllum having been completed, and a paper communicated to the Chemical Society, my colleagues, Drs. Mackenzie and Dixon of St. Thomas's Hospital, have published in the "Edinburgh Medical Journal" for November 1898, an account of the experiments they have made, at my suggestion, with the view of comparing the properties of Indian Podophyllum and its constituents with those of American Podophyllum and its constituents. ("The Physiological Action and Therapeutic Properties of Podophyllin, with special reference to Indian Podophyllin," by Hector W. G. Mackenzie, M.A., M.D. (Cantab.), F.R.C.P. (Lond.); and Walter E. Dixon, B.Sc., M.B. (Lond.), D.P.H. (Cantab.)). This investigation has conclusively proved that the Indian drug is to be regarded as a complete substitute for the American. In order that India may profit by the results of these investigations, it is now only necessary that steps should be taken in India to utilise the plant for the extraction of the Podophyllin, for which there is a considerable demand in English and generally in European medical practice. (Appendix H.)

The investigation of the constituents of Indian henbane, *Hyoscyamus muticus*, has now been finished, and the results have now been communicated to the Chemical Society (Trans. Chem. Soc., 1899). (Appendix I.) It has been shown that this plant contains the valuable alkaloid hyoscyamine, for which

there is a considerable demand in medicine, and that this alkaloid can apparently be more readily isolated from Indian henbane than from the other plants which are now resorted to for this purpose. It should, therefore, be profitable to export the drug to this country.

A sample of kino produced in North Malabar having been forwarded by the Inspector-General of Forests for examination and commercial valuation, a report on the subject has been transmitted to the Reporter on Economic Products. (Appendix J.) It appears that, although the price of kino is subject to considerable fluctuation, the Malabar kino, being of excellent quality, might be profitably put on the English market under conditions referred to in the report.

Indian Hemp.—Through the great kindness of Dr. David Prain, of the Botanical Gardens, Sibpur, I have received a large supply of carefully prepared Ganja, which has enabled me to make further progress with this important inquiry.

Indian Tanning Materials.—A number of additional specimens of tanning materials have been examined during the year, and reports will shortly be made showing the results that have been obtained from the examination of the various plants collected in India in different districts and stages of growth.

Indian Dye-stuffs.—A further account of the constituents of *Delphinium Zalil* has been communicated to the Chemical Society, and a paper printed in its Journal. "The Colouring Matter of the Indian Dye-Stuff, Asbarg, *Delphinium Zalil*, by A. G. Perkin and J. A. Pilgrim, Trans. Chem. Soc., 1898.")

Indian Food Grains.—A number of Indian food grains have been analysed and reported upon by Professor Church, F.R.S. (Appendix K), who has also reported upon the mode of preparation and nutritive value of Raji, *Eleusine coracana.* (Appendix L.)

Indian Timber.—A sample gunstock having been made at the Royal Small Arms Factory, Enfield, from Pyinma wood, *Lagerstræmia Flos-Reginæ*, the Director-General of Ordnance Factories reported that it was unsuitable, chiefly on account of the number of knots and galls in the wood, in other respects the timber appears suitable for this purpose, and it therefore remains to be seen whether a supply of wood nearly free from these deficiencies can be obtained.

India-rubber.—In view of the enormous quantities of india-rubber now employed both in this country and generally in Europe, it is most important that the entire subject should be examined and reported on from the scientific standpoint, with the view of improving the production of india-rubber of various types, and, if possible, of discovering new plants capable of furnishing rubber-like material. A report has been made (Appendix M) on a sample of Para rubber from Burma and a sample of Ceara rubber from Madras, from which it is clear that greater care should be taken in the preparation of the rubber for the English market, several Indian samples having been prepared in a somewhat careless way, so that dirt and other extraneous matter is mixed with the rubber, greatly diminishing the commercial value. The same defects were apparent in a sample of rubber, *Ficus elastica*, sent from the Charduar plantation, Assam (Appendix N). In the reports on these samples I have alluded to the importance of the whole subject, and have asked that the Scientific and Technical Department may be supplied with certain material, with a view to the investigation of several points which are now obscure, and also in the hope of discovering in India new sources of rubber or rubber-like substances. In connexion with the letter subsequently received from the Reporter on Economic Products (F. S. S. No. 384/32, dated 9th February 1899), in which, whilst recognising the importance of the inquiry, he considers it undesirable to proceed at once with the collection of the material, I venture to express the hope that as little delay as possible will arise in obtaining it, since the matter is one of immediate importance, and, indeed, through the good offices of Dr. Prain, who has already furnished me with the rubber-like products of two plants, the experimental inquiry has already been commenced.

Mica from Jeypore.—A number of samples of mica having been received through the Reporter on Economic Products, from the Resident at Jeypore, they were referred to mica experts, who, however, reported very unfavourably upon them. At the same time, information was supplied which will enable the authorities in Jeypore to obtain better samples, and to understand precisely the character of mica which commands the best price in the English market. (Appendix O.)

In concluding this annual report, I wish again to emphasise the importance of a matter which was referred to in my last quarterly report (Appendix C), where I drew attention to the necessity of prompt action being taken in India to secure the commercial consequences of the reports and investigations conducted in and through the Scientific and Technical Department of the Imperial Institute, so that raw materials which have been definitely ascertained to be of commercial value should be promptly utilised and supplied to the proper manufacturers or consumers. It will be evident from a perusal of the reports now annexed that there are already several subjects ripe for commercial treatment in India.

WYNDHAM R. DUNSTAN,
Director, Scientific Department.

30th March 1899.

APPENDICES to Professor DUNSTAN'S Annual Report.

APPENDIX A.

Quarterly Report by the Director of the Scientific Department on Inquiries conducted for the Government of India.

A number of ivestigations are being actively prosecuted in the Scientific Department, and I have as yet little information to add to that contained in my recent annual report.

The investigations of Indian coals and of Indian Podophyllum have been completed, and final reports submitted.

Work is being continued in the following subjects:—Indian dye-stuffs, Indian aconites, Indian food grains, Indian edible oils, Indian opium, Indian tanning materials, Indian *Hyoscyamus*, Indian hemp.

In connexion with the opium inquiry, a number of samples of alkaloids have been received from India, and are now under examination.

A report has been made on a sample of Malabar kino, the quality of which proved to be most satisfactory, and suggestions have been made in reference to the promotion of the sale of Indian kino in this country.

Professor Church has undertaken to make an examination of "Raji" and other food materials which are expected shortly to arrive from India.

WYNDHAM R. DUNSTAN,
Director, Scientific Department.

14th July 1898.

APPENDIX B.

Quarterly Report by the Director of the Scientific and Technical Department on Inquiries conducted for the Government of India.

As I reported last July, just before the commencement of the summer vacation, on the progress of the work of the Scientific Department, all I need now state is, that the investigations of the subjects there referred to are being actively proceeded with.

WYNDHAM R. DUNSTAN,
Director, Scientific Department.

10th October 1898.

Appendix C.

Quarterly Report by the Director of the Scientific and Technical Department on Inquiries conducted for the Government of India.

The attention of the staff of the Scientific and Technical Department has been almost exclusively occupied with Indian inquiries during the past three months. Investigations of Indian opium, Indian hemp, Indian oils, Indian fibres and other Indian products have been actively proceeded with, and the following reports have been made and dispatched to India:—

Indian Fibres.—A report has been made on the fibres of *Calotropis gigantea* (Madar fibre) from Madras, and *Villebrunea integrifolia* (Ban Riha) from Assam. The latter fibre has given very promising results, which seem to indicate that this fibre may be superior to that known as China grass. At the same time, the untreated fibre was submitted for examination, and it would be premature to pronounce a definite opinion until further samples of the treated material have been received from India.

The representative of one of the largest cocoanut fibre manufacturers in the United States made an inquiry as to the possibility of obtaining a large and regular supply of this fibre from Madras. After inspecting the samples exhibited in the Indian Section, which he stated were very satisfactory, he desired that authentic information on this subject should be supplied to him with the view of opening up a new supply for the American factory, which had hitherto been met from the West Indies. The request for this information has been forwarded to the Reporter on Economic Products to the Government of India.

A specimen of "Sabai" fibre was forwarded by Professor Marshall Woodrow, of the College of Science, Poona, with a request for information as to its commercial value. This was obtained, and a report forwarded to the Reporter on Economic Products, with a request that he would communicate with Professor Woodrow on the subject.

A request from a fibre broker for samples of Tacca fibre, produced in India, with a view to a supply being obtained for this country, has also been referred to the Reporter on Economic Products.

Indian Oils.—The large and representative collection of samples of edible oils which has reached the Institute during the last few years has now been examined. Since the whole staff of the Scientific and Technical Department was already fully occupied, I arranged with two of my assistants in the chemical laboratory of St. Thomas's Hospital, who had given particular attention to this subject, to undertake the preliminary survey of these oils. The voluminous report thus made has been forwarded to India, whilst a paper by Dr. Crossley and Mr. Le Sueur has appeared in the "Journal of the Society of Chemical Industry." It is hoped that in this way attention may be drawn to the merits of these oils.

Indian Medicinal Plants.—Since the publication of the last papers on the Indian aconites, a memoir entitled "The Pharmacology of Aconitine, Diacetyl-" aconitine, Benzaconine, and Aconine considered in relation to their chemical " constitution," communicated to the Royal Society by Professor Cash, F.R.S., of Aberdeen, and myself, has been printed in the "Philosophical Transactions." A reprint of this paper has been forwarded to India, as it contains much information which is likely to be of value to those who are interested in the medicinal employment of aconite. Further work on the alkaloids of the Indian aconites has been in progress, and will shortly be reported upon.

In connexion with the previous work on the chemistry of Indian Podophyllum, a paper has now appeared by my colleagues, Drs. Mackenzie and Dixon, of St. Thomas's Hospital, on the medicinal effect of Indian Podophyllum and of the products derived from it. ("Edinburgh Medical Journal," November 1898.) This investigation, which was undertaken with

the view of comparing the effects of Indian Podophyllum with those of American Podophyllum, has proved that the Indian drug is a complete substitute for the American product. Since this subject has now been fully investigated both on the chemical and on the medical side, and it is proved that the chemical constituents of *Podophyllum emodi* are identical both in their composition and action with those of *Podophyllum peltatum*, it is to be hoped that steps will at once be taken in India to develop the utilisation of this plant for the extraction of the Podophyllin, for which there exists a considerable demand in English and Continental markets.

The investigation of the constituents of the Indian henbane, *Hyoscyamus muticus*, has now been completed. The report has been forwarded to India, and a paper is about to appear in the Journal of the Chemical Society of London. It has been shown that this plant contains the alkaloid hyoscyamine, for which there is considerable demand in medicine, and, further, that this alkaloid can apparently be more readily extracted from Indian henbane than from the other plants which are now resorted to for this purpose.

Indian Food-stuffs.—A report has been made by Professor Church, F.R.S., on *Cyanotis axillaris*, and on three varieties of *Indigofera*,—*I. linifolia I. glandulosa*, and *I. cordifolia*, and forwarded to India.

Professor Church has also reported on the possibilities of Raji tailings as a prison food in India.

Indian Woods.—A sample gun-stock, made from Pyinma wood, *Lagerstræmia Flos-Reginæ*, under the supervision of the Director-General of Ordnance Factories, was reported by him to be unsuitable, chiefly on account of the number of knots and galls in the plank. Otherwise, the wood seemed suitable for its purpose, and the question, therefore, remains whether a supply of this wood can be obtained which is comparatively free from these deficiencies.

In concluding this Quarterly Report on the work done for the Government of India in the Scientific and Technical Department, I would point out the necessity of prompt action being taken in India with a view to the commercial utilisation of those products which have been examined and favourably reported upon by this Department. It is most important that proper organisation should exist in India for at once determining how such raw materials may best be utilised and regularly supplied to the proper manufacturers or consumers.

WYNDHAM R. DUNSTAN,
Director, Scientific Department.

6th January 1899.

APPENDIX D.

Report on the Fibre of *Calotropis gigantea* (Madar) from Madras, and on the Fibre of *Villebrunea integrifolia* (Ban Riha) from Assam.

Calotropis gigantea.—The "Madar" fibre shown in the Indian and Colonial Exhibition of 1886 having attracted some attention, the Sub-Committee on Fibres, acting in concert with the Scientific and Technical Department of the Imperial Institute, asked for a supply of this fibre, so that its chemical composition and general characters might be ascertained. In reply to this request, the Department was informed by the Reporter on Economic Products to the Government of India that a small specimen of the bark-fibre had been obtained in February 1898, after very great difficulty, and it was then stated that owing to the difficulty of obtaining any quantity of the fibre, the subject was unlikely to assume any practical importance. The only chemical examination of this fibre on record is that by Messrs. Cross and Bevan, in their report on the fibres exhibited in 1886, the results of which are given below. The sample now examined differs in some respects from that dealt with by Messrs. Cross and Bevan in particular, the length of the staple is greater, averaging 12 inches. Chemical examination, by the method followed in the Scientific Department of the Imperial Institute in investigating the composition

and characters of fibres, furnished the following results, which may be compared with those of Messrs. Cross and Bevan :—

——	Cross and Bevan.	Imperial Institute.
Moisture, per cent	7·3	8·88
Ash, per cent	2·5	3·25
Hydrolysis (*a*), loss per cent.	13·0	10·86
Hydrolysis (*b*), loss per cent.	17·6	13·82
Mercerising, loss per cent.	—	11·82
Acid purification, loss per cent.	8·5	8·58
Nitration, gain per cent.	53·5	56·96
Cellulose, per cent.	76·5	84·25
Length of ultimate fibre	10–30 mm.	10–30 mm.

A comparison of these figures shows that on the whole the latter sample is the better of the two. These results will be useful as a record of the composition of this fibre, although at present the subject may not possess any commercial interest.

Villebrunea integrifolia.—An examination of "Ban Riha" fibre was particularly asked for by Dr. Watt (Flying Seal Series, dated 28th April 1898). Unfortunately the untreated bark-fibre was sent for examination, consisting of the bark peeled from the plant—containing the bark-fibres in strips from 3 to 5 feet in length. The only course to adopt was to imitate as nearly as possible the retting precess adopted on an industrial scale, which the almost complete absence of gum rendered possible. Two samples of fibre were received. A small quantity of each was placed in dishes, covered with water and allowed to stand for about three weeks, after which time one of the samples was sufficiently soft for the fibre to be removed. This was carefully combed and picked, and by this means about 10 grams of a nearly clean brown fibre in long silky threads were procured. The fibre thus treated was then submitted to the usual examination, with the following results :—

——	Ban Riha.	Bœhmeria nivea.
Moisture, per cent.	10·93	9·0
Ash, per cent.	3·52	2·9
Hydrolysis (*a*), loss per cent.	8·22	13·0
Hydrolysis (*b*), loss per cent.	15·82	24·0
Mercerising, loss per cent.	8·05	11·0
Acid purification, loss per cent.	5·09	6·5
Nitration, gain per cent.	56·88	25·0
Cellulose, per cent.	80·04	80·3
Length of ultimate fibre	40 mm. and upwards.	40-200 mm.

It is interesting to compare these numbers with those obtained in the examination of the fibre of *Bœhmeria nivea* (commonly known as "Rhea" or "China grass") made by Messrs. Cross and Bevan. Dr. Watt has pointed out that these two fibres are certainly distinct; the Ban Riha may be the more important of the two owing to its growing wild on waste land, to its containing little or no gum, and also because it furnishes a silky fibre at least as strong as China grass, with which, indeed, it, and not *Bœhmeria nivea*, may prove to be identical. A comparison of the results of the examination of these two fibres clearly brings out the superiority of the Ban Riha, especially in regard to its smaller loss by hydrolysis and its higher nitration number. At the same time it must be remembered that the process adopted in treating this fibre in the laboratory only very roughly approximates to that which would be used on a large scale.

Portions of the original samples have been submitted to a fibre expert, who reports that they can be readily treated by a special and simple process which has recently been devised. Further information as to this process can be supplied if this aspect of the matter is thought to be of importance.

In any case a sample of the properly retted and prepared fibre should be sent for chemical examination.

WYNDHAM R. DUNSTAN.

19th October 1898.

APPENDIX E.

Memorandum on the Supply of Crude Coconut Fibre from India.

One of the principal members of an American Fibre Company has applied to me, as Director of the Scientific and Technical Department of the Imperial Institute, for information as to the possibility of obtaining from India a regular supply of crude coconut fibre. At present, the Company in which he is interested, obtains nearly the whole of its supply from the West Indies, but they are anxious to procure further quantities from India. What is required is the "brush" and "mat" fibre mixed, that is, beaten out together. He has inspected the sample from Madras, which is exhibited in the Indian Section here, and considers it to be quite satisfactory. He wishes to learn, at as early a date as possible, the amount of this fibre which is available, the price of it in Madras, and also whether a regular supply, say about 300 tons per annum, could be relied upon. As the information is urgently needed, I suggest that the Reporter on Economic Products might communicate direct with Mr. G. E. Darrell-Astwood, whose address until the end of January will be General Post Office, Colombo, Ceylon, letters to be marked "to be called for." If it should not be possible to communicate the facts to Mr. Darrell-Astwood before that date, the report should be sent in the usual way through the Imperial Institute.

WYNDHAM R. DUNSTAN.

21st December 1898.

APPENDIX F.

Memorandum on "Sabai" Fibre and on "Tacca" Fibre.

Sabai Fibre.—A small sample of Sabai or Bhabar fibre, *Ischæmum angustifolium*, Hack., has been sent to the Imperial Institute by Professor Marshall Woodrow, of the College of Science, Poona, for commercial valuation, with the information that this fibre could be delivered on board ship at Rs. 40 per ton, and that samples weighing about 100 lbs. each were available at Poona and could be obtained through the usual channels. I have submitted a sample of this fibre to our expert, who states that while it could probably be used for paper-making, he might also find an outlet for it for fancy purposes. He asks to be supplied, with as little delay as possible, with 10 lbs. of the butt ends cut as the sample which I now enclose. The lengths of the butts should be at least 12 inches, nothing shorter than 8 inches being of any value, and they should be as white as possible.

Since our previous work on the subject of Indian fibres has originated with the Revenue and Agricultural Department of the Government of India, it seems desirable that this opinion should be conveyed to the Reporter on Economic Products, so that he may be the means of transmitting, as rapidly as possible, the large sample which is asked for by the expert.

Tacca pinnatifida.—Our fibre expert has applied to us for samples of Tacca fibre produced in India, or for any fibre similar in its characters to Tacca. He states that this fibre may be an important article, and, indeed, that at present the demand is in excess of the supply. I enclose, herewith, a sample of ribbon submitted by him, which is stated to be prepared by scraping the green shoots carefully and drying them. He asks to be supplied with about 10 lbs. of the whole length fibre, or grass, including the green portion, which may possibly be useful for other purposes, and also with 10 lbs. of butts which must be as white as possible. In sending these samples, information should be given as to the price of the butts and of the green fibre separately.

It is hoped that the Reporter on Economic Products will take steps to supply samples of both these fibres with as little delay as possible.

WYNDHAM R. DUNSTAN.

16th November 1898.

Appendix G.

Report on Indian Edible Oils.

Among the subjects awaiting investigation by the Scientific Department at the beginning of the present year was that of Indian edible oils, samples of which have been collected in India during the last two years under the supervision of the Reporter on Economic Products to the Government of India, and despatched by him to the Imperial Institute. As the subject is an important one, and the entire staff of the Department was, and is now, occupied with other investigations, most of them on Indian subjects, I decided to arrange for these oils to be examined in my laboratory at St. Thomas's Hospital by two of my assistants specially competent to engage in such work, Dr. A. W. Crossley, M.Sc., Ph.D., and Mr. H. R. Le Sueur, B.Sc. The Government Grant Committee of the Royal Society were good enough to make a small grant from the Government Fund for Scientific Research to defray the expenses connected with these experiments.

The plan of investigation which seemed to me likely to be most serviceable was to examine, in the first instance, the chief physical and chemical characters of each oil, so as to furnish a basis for their comparison with well-known and largely used edible oils, and thus to render it possible to obtain a report on the commercial value of the Indian samples. After this preliminary survey of the entire collection, it might prove to be worth while to examine more minutely the chemistry of those oils which appeared to present features of novelty. The preliminary examination of the oils has now been completed by Messrs. Crossley and Le Sueur, who will present an account of their results to the Society of Chemical Industry, which will subsequently be printed in the journal of that Society. By this means it is hoped that the attention of oil-brokers and merchants will be directed to the variety of excellent oils, belonging to almost every class, which are obtainable in India, and that the experimental data will enable us to obtain a trustworthy opinion as to their commercial uses and value. I ought to say that when the oils were first received I made several attempts to ascertain their market value, but entirely without success, as no scientific data existed as to their composition and quality.

The following is a list of the oils which have been examined, and a general summary of the results which have been obtained :—

Amoora Rohituka.
Anacardium occidentale.
Arachis hypogæa.
Argemone mexicana.
Bassia latifolia.
Bassia butyracea.
Brassica alba.
Brassica campestris.
Brassica juncea.
Brassica nigra.
Buchanania latifolia.
Carthamus tinctorius.
Cocos nucifera.
Carthamus oxyacantha.
Eruca sativa.
Guizotia abyssinica.
Garcinia indica.
Juglans regia.
Lepidium sativum.
Linum usitatissimum.
Lutni mustard.
Olea europea.
Papaver somniferum.
Raphanus sativus.
Vateria indica.

Constants Determined.

The liquid oils, with but one or two exceptions, were perfectly clear, and were not, therefore, submitted to any process of purification before analysis. When this was not the case, the sample was first freed from foreign matter by filtration. The solid oils were in all cases melted, filtered, and dried before analysis. The methods employed for determining the constants of the oils are those in ordinary use, and usually the details given in "The Chemical Analysis of Oils, Fats, and Waxes," by Lewkowitsch, have been followed. The following points were determined :—

Specific gravity.
Melting point.
" Hehner " value.
Viscosity.
Rotatory power.
Drying properties.

The following table includes the results of the examination of the chemical and physical characters of all the oils in the present collection :—

TABLE referred to

No.	Scientific Name.	English Name.	Locality.	Remarks.	Appearance, Odour, Flavour.
7795	Amoora Rohituka -	Evergreen tree -	Bengal -	—	Clear dark brown -
7051	Anacardium occidentale -	Cashew nut - -	Madras -	—	" " " -
5856	Arachis hypogæa - -	Ground, earth, or pea-nut.	" -	No. 1 - -	Clear very pale yellow -
5857	" " - -	" "	" -	No. 2 - -	" " " " -
5858	" " - -	" "	" -	No. 3 - -	" " " " -
5859	" " - -	" "	" -	—	" " " " -
7781	Argemone mexicana -	Mexican or prickly poppy.	Bengal -	—	Dark orange yellow -
7783	" " -	" "	" -	—	Greenish brown - -
6860	Bassia latifolia - -	Butter or mahua-tree.	" -	—	S, yellowish white; L, clear orange yellow.
7050	" " - -	" "	" -	—	S, yellow; L, clear deep orange.
6862	" " - -	" "	Madras -	—	" " "
7058	" " - -	" "	" -	—	S, yellowish white; L, clear orange yellow.
7780	" " - -	" "	" -	—	S, white greenish tinge; L, clear greenish yellow.
6861	" " - -	" "	N.-W. Provinces.	—	S, dirty yellow; L, clear deep orange.
7801	" " - -	" "	C. Provinces	—	" " "
6752	" " - -	" "	Calcutta -	—	" " "
7785	" " - -	" "	Bombay -	—	S, yellowish white; L, clear yellow.
7788	Bassia butyracea - -	Indian butter-tree	N.-W. Provinces.	—	S, pale orange; L, pale brown.
6856	Brassica alba - -	White mustard -	Bengal -	—	Clear pale yellow, mustard smell.
6865	Brassica campestris -	Rape seed -	N.-W. Provinces.	Var. red -	" " "
6863	" " -	" " - -	" "	" glauca -	" " "
6864	" " -	" " - -	" "	" dichotome	Clear brownish yellow -
7784	" " -	" " - -	Punjab -	—	" " " -
7786	" " -	" " - -	Bombay -	Var. brown -	Slightly cloudy, pale brown.
7790	" " -	" " - -	" -	" yellow -	Clear Orange yellow -
7791	Brassica juncea - -	Indian mustard -	" -	" mustard	Clear pale yellow -
6855	" " - -	" " -	Bengal -	" rai -	Clear dark orange -
6857	Brassica nigra - -	Black mustard -	" -	—	" " " -
7803	" " - -	" " -	C. Provinces	—	" " " -
6978	Buchanania latifolia -	——	N.-W. Provinces.	—	S, pale orange; L, pale orange.
7854	" " -	——	" "	—	S, brownish yellow; L, pale brown.
7806	Carthamus tinctorius -	Safflower - -	C. Provinces	—	Clear orange yellow -
7792	" " -	" - -	Bengal -	Pressed oil -	Black, pitchy smell -
7793	" " -	" - -	" -	Distilled -	Clear orange yellow -
6900	" " -	" - -	Punjab -	—	" " " -

in Appendix G.

Specific Gravity at 15·5° C.	Acid Value. As KOH.	Acid Value. As Oleic Acid.	Saponification Value.	Iodine Value.	Reichert Meissel Value.	Insoluble Fatty Acids.	D., Drying Oil. S.D., Semi-drying Oil. N.D., Non-drying Oil.	Rotation in 20 cm. Tube.	Viscosity. Number of Sections for 50 c.cs. to flow at 70° F.	Viscosity. Ratio to Water at 70° F.	Melting point. °C.
·9386	17·03	4·28	189·70	134·86	1·64	93·23	D.	—	375·8	14·79	
·9594	—	—	45·10	294·26	1·26	—	N.D.	—	—	—	
·9223	5·76	1·45	190·10	98·47	·00	95·63	N.D.	−7′	350·1	13·78	
·9223	9·60	2·42	185·60	98·42	·00	—	N.D.	+24′	347·0	13·67	
·9256	32·91	8·28	194·80	92·43	·00	—	N.D.	inactive	429·3	16·90	
·9195	27 02	6·80	192·1	100·82	·00	—	N.D.	−7′	306 9	12 10	
·9247	6·00	1·51	190·3	122·53	·00	95·07	D.	—	268·9	10·59	
·9259	83·90	21·13	187·8	119·91	·00	—	D.	—	272·0	10·71	
At 100° C.									At 146° F.	At 140° F.	
·8975	11·79	2·97	194·0	62·11	·44	94·95	—	—	97·1	4·24	24·5
·8962	19·15	4·80	192·6	64·88	—	—	—	—	93·8	4·10	26 0
·8981	10·33	2·60	191·8	67·85	—	—	—	—	96·9	4·23	25·0
·8970	4·83	1·23	190·9	58·53	—	—	—	—	107·0	4·67	26·5
8964	8·67	2·16	187·4	58·45	—	94·69	—	—	100·6	4·39	29·0
·8969	21·20	5·33	189·5	63·51	—	—	—	—	93·9	4·10	23 0
·8971	17·05	4·29	188·8	63·01	—	—	—	—	96·7	4·22	24·0
·8943	70·82	17·83	193·2	58·59	·88	—	—	—	90·4	3·95	25·5
·8980	6·83	1·72	190·5	53·43	—	—	—	—	96·9	4·23	24·0
·8970	16·44	4·14	190 8	42·12	·44	94 86	—	—	110·4	4·82	39·0
·9142	5·40	1·36	171·2	96·75	·00	95·86	N.D.	−5′	402·0	15·82	
·9148	2·90	·73	171·6	99·20	·79	96·30	S.D.	−7′	390·3	15·38	
·9142	1·78	·45	171·4	97·71	·67	95·04	S.D.	−10′	402 6	15·85	
·9154	1·57	·39	172·2	104·84	·22	95·57	S.D.	—	371·8	14·64	
·9163	2·57	·65	173·4	96·25	·43	94·56	S.D.	—	393·2	15·4	
·9171	4·00	1·00	172·8	94·10	·00	—	S.D.	—	464·6	18 2	
·9141	1·42	·36	169·4	96·66	·00	—	S.D.	−5′	413·8	16·29	
·9206	3·79	·94	180·1	108·29	·89	—	S.D.	−25′	382·8	15·08	
·9158	7·12	1·79	172·1	101·82	·33	95·49	S.D.	−18′	379·3	14·93	
·9155	7·35	1·85	173·3	98·84	·00	96·05	N.D.	−17′	425·4	16·75	
·9185	5·72	1·44	173·0	110·51	·00	—	N.D.	−30′	355·4	13·99	
At 100° C.									At 140° F.	At 140° F.	
·8941	15·03	3 78	195·4	54·73	·33	95·80	—	—	89·3	3·90	32·0
·8943	40·11	10·09	191·8	59·92	—	94·87	—	—	84·6	3·69	32·0
·9267	10·41	2·62	192·5	140·05	—	95·30	D.	+8′	256·1	10·08	
·9634	—	—	188·0	128·93	—	—	D.	—	—	—	
·9264	3·68	·92	190·3	144·4	—	—	D.	+7′	247·8	9·76	
·9275	8·28	2·08	186·6	138·64	·00	—	D.	—	274·5	10·81	

No.	Scientific Name.	English Name.	Locality.	Remarks.	Appearance, Odour, Flavour.
6898	Carthamus tinctorius	Safflower	Punjab	Oil from cultivated form.	Clear light yellow
6901	„ „	„	Hyderabad	Cold dry expression.	„ „ „
6202	„ „	„	Bombay	Oil from dye plant.	„ „ „
6903	„ „	„	„	Oil from oil-seed plant.	„ „ „
7048	„ „	„	Cawnpore	Var. thornless	„ „ „
7049	„ „	„	„	„ thorny.	Clear orange yellow
6979	„ „	„	Madras	—	Clear pale yellow
6794	Carthamus oxyacantha	„	Punjab	—	Clear pale orange
6867	Cocos nucifera	Cocoa palm	Malabar	—	S, white; L, straw colour
6852	„ „	„ „	Bengal	—	S, white; L, clear pale yellow.
7798	„ „	„ „	Bombay	—	S, white; L, clear colourless.
7797	Eruca sativa	Allied to mustard	„	—	Slightly cloudy, orange yellow, turnip smell.
7794	„ „	„ „	Punjab	—	Clear dark orange
6866	„ „	„ „	Cawnpore	—	Light brown green tint
7782	Guizotia abyssinica	Niger seed	Bombay	—	Clear pale yellow
7796	„ „	„ „	Madras	—	Clear light orange
7799	„ „	„ „	Bengal	—	„ „ „
7804	„ „	„ „	C. Provinces	—	„ „ „
7835	Garcinia indica	Kokam butter	Bombay	—	S, pale brown; L, clear brown.
7851	Juglans regia	Walnut tree	Punjab	—	Orange yellow, linseed smell.
7853	Lepidium sativum	Cress	„	—	Orange yellow
7805	Linum usitatissimum	Linseed, flax	C. Provinces	—	Light brown
6858	Brassica napus	Lutni mustard	Bengal	—	„ „
7852	Olea europea	Olive	Punjab	—	Greenish brown
7789	Papaver somniferum	Opium or white poppy.	„	—	Light brown
7787	„ „	„ „	N.-W. Provinces.	—	Clear orange yellow
6859	„ „	„ „	„ „	—	„ „ „
6854	„ „	„ „	Bengal	—	„ „ „
6868	Raphanus sativus	Radish	Assam	—	Clear light brown
7036	Vateria indica	White dammar	Madras	—	S, greenish white; L, clear greenish yellow
7802	„ „	„ „	„	—	„ „ „

Specific Gravity at 15·5° C.	Acid Value. As KOH.	Acid Value. As Oleic Acid.	Saponification Value.	Iodine Value.	Reichert Meissel Value.	Insoluble Fatty Acids.	D., Drying Oil. S.D., Semi-drying Oil. N.D., Non-drying Oil.	Rotation in 20 cm. Tube.	Viscosity. Number of Sections for 50 c.cs. to flow at 70° F.	Viscosity. Ratio to Water at 70° F.	Melting Point. °C.
·9267	·76	·19	189·6	144·05	—	—	D.	+10′	249·1	9·81	
·9277	2·58	·65	187·9	138·60	—	—	D.	+14′	274·7	10·79	
·9262	2·67	·67	187·2	143·4	—	—	D.	+8′	250·3	9·85	
·9269	6·20	1·56	191·3	149·93	—	—	D.	+4′	249·6	9·83	
·9271	5·92	1·49	189·4	141·42	·00	—	D.	+7′	258·8	10·19	
·9251	20·02	5·04	190·5	141·12	·00	—	D.	—	243·0	9·57	
·9280	4·12	1·04	192·4	142·85	—	—	D.	+6′	268·8	10·53	
·9270	3·66	·92	189·4	135·49	—	95·44	S.D.	+7′	294·0	11·57	
At 100° C.									At 140° F.	At 140° F.	
·9030	35·21	8·86	258·2	8·54	6·71	—	—	—	63·9	2·79	23·5
·9040	11·84	2·98	255·6	8·41	6·79	82·35	—	—	64·7	2·83	24·5
·9042	9·95	2·50	255·5	8·25	6·65	—	—	—	64·5	2·82	25·0
·9177	2·10	·53	170·4	99·72	·66	95·49	N.D.	—	371·0	14·61	
·9152	3·70	·93	169·0	97·41	·11	—	N.D.	−11′	405·8	15·98	
·9165	2·51	·63	174·1	99·10	·77	—	N.D.	−18′	369·4	14·54	
·9263	9·75	2·45	191·8	126 60	·33	94·11	D.	inactive	292·6	11·52	
·9251	5·21	1·31	191·3	131·70	·11	—	D.	„	263·1	10·36	
·9248	11·69	2·94	188·9	128·60	·11	—	D.	„	283·7	11·17	
·9263	7·05	1·77	192·2	133·80	·63	—	—	+18′	273·9	10·78	
At 100° C.									At 140° F.	At 140° F.	
·8889	14·15	3·56	186·8	34·21	·11	94·59	—	—	101·1	4·41	42
·9259	10·07	2·53	192·5	143·10	·00	95·44	S.D.	+16′	231·8	9·13	
·9221	4·18	1·05	183·1	118·40	·22	95·57	S.D.	—	321·6	12·66	
·9337	4·84	1·22	191·5	165·40	·00	94·81	D.	+6′	211·7	8·33	
·9146	3·77	·95	167·7	97·70	·00	95·55	N.D.	−15′	398·0	15·67	
·9203	5·06	1·27	190·9	93.67	·60	95·14	N.D.	—	312·3	2)	
·9255	10·78	2·71	196·8	137·10	·00	—	D.	inactive	254·8	10·03	
·9260	6·35	1·60	190·1	133·70	·00	—	D.	„	259·1	10·21	
·9268	11·02	2·77	190·6	133·90	·00	94·97	D.	„	258·7	10·19	
·9255	8·68	2·18	189·0	134·00	·00	—	D.	+4′	253·9	10·00	
·9163	14·47	3·64	173·8	92·85	·33	95·94	N.D.	+17′	385·9	15·17	
At 100° C.									At 140° F.	At 140° F.	
·8907	5·18	1·30	189·2	39·63	·44	95·21	—	—	104·0	4·54	37·5
·8900	15·34	3·86	188·7	37·82	·22	95·14	—	—	101·5	4·43	37·0

The following is a classification of the oils according to their drying properties :—

Drying.	Semi-drying.
Amoora Rohituka.	*Brassica campestris.*
Argemone mexicana.	*Brassica juncea.*
Carthamus tinctorius.	*Carthamus oxyacantha.*
Guizotia abyssinica.	*Juglans regia.*
Linum usitatissimum.	*Lepidium sativum.*
Papaver somniferum.	
Non-drying.	**Solid or Semi-solid at ordinary temperatures.**
Anacardium occidentale.	*Bassia latifolia.*
Arachis hypogæa.	*Buchanania latifolia.*
Brassica alba.	*Cocos nucifera.*
Brassica nigra.	*Garcinia indica.*
Eruca sativa.	*Vateria indica.*
Lutni mustard.	
Olea europea.	
Raphanus sativus.	

The chief characters of the oils may thus be summarised :—

Amoora Rohituka.—(No. 1.) The seeds of this evergreen tree yield an oil which is used by the natives for various economic purposes, such as illuminating, and medicinally. The sample examined by us is clear and of a reddish brown colour, without any particular taste and a slight odour resembling that of linseed oil. It is a drying oil, and its constants approximate to those of Niger seed.

Anacardium occidentale.—(No. 2.) Cashew nut. Two distinct oils are produced from this plant. The one, pressed from the kernels, is a light yellow bland oil, the other, known as Cardole or Cashew apple oil, is prepared from the pericarp or shell of the nut, and is black, acrid, and powerfully vesicating. The sample examined apparently belongs to the latter class, it is clear and of a very dark reddish-brown colour. Though it possesses the abnormal iodine value of 294·6 (mean of three determinations), practical experiment shows it to be a non-drying oil. It has evidently suffered decomposition, and this rendered it impossible to determine some of its constants, *e.g.*, in attempting to carry out the determination of the insoluble fatty acids they appeared as a dark brown gummy mass.

Arachis hypogæa —(Nos. 3 to 6.) The four samples are all of a very pale yellow colour, with little taste or smell, and deposit solid matter on standing. It will be noticed that the specific gravity is higher than generally recorded, approaching rather closely to that of poppy-seed oil, with which *Arachis* oil is said to be adulterated. The iodine value, however, is normal, *i.e.*, below 100, whereas the iodine value of poppy seed oil is over 130. It is hardly necessary to again point out that the genuineness of our samples is undoubted.

Argemone mexicana.—(Nos. 7 and 8.) The spiney herbaceous annual from the seeds of which this oil is extracted is very abundant in India, and practically an unlimited amount of the oil is available. Of the two samples, one, No. 7, is of a dark orange colour, and possesses a slight but distinct smell. The other, No. 8, is greenish-brown in colour, contains a very large percentage of free fatty acids, and is completely soluble in 9 and 10 volumes of absolute alcohol at the ordinary temperature, whereas No. 7 is not soluble even at a temperature of 40° C. We mention this fact, because Charbonnier has stated that this oil is soluble in 5-6 volumes of alcohol at 32·2° C., a statement which has been refuted by Flückiger. It is evidently quite possible for both statements to be correct. Both our samples come under the heading of drying oils.

Bassia latifolia.—(Nos. 54 to 62.) Mahua butter. Our samples of this oil, which is also known as Illipe butter, possess in the solid state a yellow colour, one sample, No. 58, having a decided green tinge; when liquefied they are clear, and vary in colour from yellow to orange. This oil is not

identical with, and should not be mistaken for, Mohwah butter or Mowrah seed oil, which is extracted from the seeds of *Bassia longifolia*, nor with Phulwara butter, which is obtained from *Bassia butyracea*, or Indian butter tree.

Brassica family.—(Nos. 9 to 20.) No. 9, *Brassica alba* or white mustard, is of a clear, pale yellow colour and smells of mustard seed oil. Its constants are almost identical with those of the other members of this family.

Brassica campestris.—(Nos. 10 to 15) include specimens of all the varieties produced in India. They are clear oils varying in colour from yellow to pale brown, and possess the characteristic mustard smell.

Brassica juncea.—(Nos. 16 and 17) is largely used in India as an article of food and also medicinally. They are clear yellow oils, possessing a distinct odour and taste.

Brassica napus.—(No. 18), Lutni mustard, is clear and light brown in colour.

Brassica nigra.—(Nos. 19 and 20) are clear and dark orange coloured.

The whole (*Brassica*) family belong to the class of semi-drying oils.

Buchanania latifolia.—(Nos. 64 and 65) This oil is rarely prepared, as the seeds are much prized by the natives of India as a sweetmeat. The constants of the specimens, which in the solid state are orange and in the liquid state clear orange and pale brown respectively, agree closely with those of *Bassia latifolia.*

Carthamus tinctorius.—(Nos. 21 to 32.) Safflower or saffron oil is extracted from an herbaceous plant, which until recently was cultivated all over India for the preparation of the well-known dye. Two distinct varieties of plants are grown, the spiny or thorny variety and the spineless or thornless variety. The oil is obtained from two kinds of fruits, one the cultivated—a white and glossy form, the other smaller and of a mottled brown grey and white appearance. Two methods are employed for the preparation of the oil, the ordinary cold dry expression method and the so-called hot extraction process, which latter is in reality a crude process of downward distillation. The first method yields an oil which is largely used for burning, whereas that obtained by the latter process is useless for this purpose, and is employed by the natives for the preservation of leathern vessels, ropes, &c., exposed to the action of the water. The samples (21 to 32) include all the different varieties prepared in India. They are, with the exception of No. 22, clear, and vary in colour from very pale yellow to orange, possess a faint odour and taste, neither of which is particularly characteristic. They rotate the plane of polarisation slightly to the right, and in general resemble the white poppy seed and walnut oils.

Safflower is an exceedingly good, drying oil and its chemistry is being thoroughly investigated. No. 22, prepared by the hot extraction process, is quite black in appearance, and has a decided pitchy smell. Its specific gravity is much higher and its iodine value lower than any of the other samples. It is a non-drying oil.

The variety *oxyacantha* (No. 33) differs but slightly from the *tinctorius.*

Cocos nucifera.—(Nos. 66 to 68.) Cocoanut palm. The constants of these Indian specimens agree with those on record for this oil, except the Reichert-Meissel value, which is markedly higher. In the solid state, Nos. 66 and 67 are white with a faint yellow tinge, and, in the liquid state, clear and pale yellow in colour, No. 68 is pure white, and when liquefied clear and colourless.

Eruca sativa.—(Nos. 34 to 36.) This oil is obtained from an extensively cultivated herb, closely allied to the mustards. In India it is used for burning purposes, and also to some extent as a food. The physical constants resemble those of the oil yielded by *Brassica campestris.* All three samples are clear, and vary in colour from yellow to pale brown; two of them, Nos. 34 and 36, have a well marked odour and flavour of turnip, whereas No. 35 has an odour of mustard and a rather pleasant taste. *Eruca satira* is a non-drying oil.

Garcinia indica.—(No. 69.) This oil was sent in egg-shaped masses of a dirty-white colour, containing a good deal of foreign matter. After purification it was of a pale brown colour when solid, and melted to a clear brown liquid.

Guizotia abyssinica.—(Nos. 37 to 40.) Niger seed. The samples of this drying oil are clear and vary in colour from pale yellow to orange.

Juglans regia.—(No. 41.) Walnut tree. The sample is clear and of an orange yellow colour, with a slight odour of linseed and a sickly nutty flavour. Its constants agree well with those previously recorded, and are almost identical with those of *Carthamus tinctorius*. Practical experiment shows it to be a strong drying oil.

Lepidium sativum.—(Nos. 42 and 43.) Garden cress. The samples of this oil are of an orange colour, and possesses a faint smell. The difference in their iodine values is marked; they belong to the class of semi-drying oils.

Linum usitatissimum.—(No. 44.) Linseed. The sample is of a clear orange colour, and possesses an iodine value lower than is usually recorded.

Luffa ægyptiaca.—(No. 45.) The oil is extracted from the seeds of a genus of climbing plants belonging to the family *Cucurbitaceæ*. The sample is dark reddish brown in colour, possesses a slight smell, and is a semi-drying oil.

Nigella sativa.—(No. 46.) Small fennel. Two kinds of oil are expressed from the seeds of this plant. the one is described as dark, fragrant, and volatile, and the other clear, nearly colourless, and of the consistency of castor oil. Our sample evidently belongs to the first class, it is of a dark, reddish-brown colour, with a strongly marked odour of eucalyptus, and is a semi-drying oil. On standing it deposits solid matter.

Olea europæa.—(No. 47.) The sample is clear, of a greenish brown colour. Its iodine value is abnormally high.

Papaver somniferum.—(Nos. 48 to 51.) Opium or white poppy. The oils vary in colour from pale yellow to orange, and possess a small but decided lævo-rotatory power. They are drying oils.

Prunus armeniaca.—(No. 52.) Apricot kernel. The oil is of a pale orange colour, it has a marked odour and flavour of bitter almonds, and is a semi-drying oil.

Raphanus sativus.—(No. 53.) Radish seed. The sample is clear, of a light brown colour, and has a distinct acrid flavour. It is a non-drying oil.

Vateria indica.—(Nos. 70 and 71.) Both samples in the solid state are white, with a greenish tinge, and when melted are clear and greenish yellow in colour. The constants resemble those of *Garcinia indica*.

WYNDHAM R. DUNSTAN.

23rd November 1898.

APPENDIX H.

Report on *Podophyllum Emodi.*

The chemical examination of the constituents of the Indian plant *Podophyllum Emodi*, and their comparison with those of the well-known American drug, *Podophyllum peltatum*, has now been completed, and a full account of the work has been communicated to the Chemical Society of London, and published in the "Transactions" of the Society (April 1898). A copy of this paper is sent herewith. A separate paper by Dr. H. W. G. Mackenzie will shortly be published, giving an account of the therapeutic effects of the Indian drug as compared with the American (*P. peltatum*). From the practical point of view, the following are the most important conclusions which have been arrived at. The same chemical substances are found in the Indian as in the American plant. The therapeutic action of the two drugs is the same. The therapeutic action is chiefly due to the podophyllotoxin, but also to a resinous constituent "podophyllo-resin." For the present, at all events, the most suitable medicinal preparation is the mixture of podophyllotoxin and resin, known as "podophyllin" or *Resina podophylli*. The Indian drug furnishes a larger proportion of "podophyllin" than the American, and this is equally efficacious as a remedy. The Indian drug afforded from 9 to 11 per cent. of podophyllin, whilst the American furnished between 4 and 5. The old roots of *Podophyllum Emodi* appear to contain more podophyllin than

the young, and therefore should be preferred. Young roots from Chamba contained only 3 per cent., whilst old roots contained as much as 11 per cent.

Podophyllum Emodi also contains a valuable yellow dye stuff, quercetin, which is easy to isolate, and might be worth while to extract on a large scale. The roots themselves have been employed for dyeing and have given satisfactory results.

So long as the present demand for podophyllin as a drug continues, its extraction in India from *P. Emodi* should prove to be a profitable undertaking. In consequence of the publication of the preliminary results of this inquiry, some quantity of podophyllin prepared from *P. Emodi* has been put on the English market. Slight differences in its colour and solubility have to some extent stood in the way of its general use, but there can be little doubt that as it becomes recognised that the therapeutic action of Indian podophyllin is identical with that of the podophyllin prepared from the American plant, the validity of employing the resin from either source will be generally recognised. The commercial value of podophyllin is subject to considerable fluctuations; at present the average market price of American "podophyllin" is 10*s.* per lb.

It is probable that the separation of the dye "quercetin" as a bye-product of the manufacture of podophyllin would repay the Indian producer.

WYNDHAM R. DUNSTAN.

6th July 1898.

APPENDIX I.

Report on the *Hyoscyamus muticus* of India.

A chemical examination has been made of the constituents of *Hyoscyamus muticus*, sent by the Reporter on Economic Products (Flying Seal Series, No. 2820—136, dated 15th September 1896). It has been ascertained that this plant contains the valuable alkaloid, hyoscyamine, to the extent of about ·1 per cent., and that this alkaloid can be readily extracted from the plant in a practically pure state. A detailed account of this investigation is about to be communicated to the Chemical Society of London, and it is probable that some demand may spring up for the plant in this country, where at present drugs of this class are scarce, whilst there is, at the same time, a considerable medical employment of mydriatic alkaloids, of which hyoscyamine is one of the most important.

WYNDHAM R. DUNSTAN.

1st December 1898.

APPENDIX J.

Report on a Sample of Malabar Kino.

This sample was received with Dr. Watt's letter of 29th April 1898, having been forwarded by the Inspector-General of Forests to the Government of India, with a letter dated the 17th March 1898. In the letter of the Inspector-General it is stated that the Kino from North Malabar is probably of first-rate quality and likely to command a high price in the English market, although samples which were sent to a firm of manufacturing chemists in London had not been reported on favourably.

The present sample shows all the characteristics of the Kino prescribed for use in medicine in the last edition (1898) of the British Pharmacopœia. In order to obtain reliable information as to its probable commercial value, a part of the sample was submitted to a well-known firm in the city who deal largely in this material. They report that the substance is genuine Kino of excellent quality. With reference to its commercial value, they make the following statement, which shows that there have been great fluctuations in the price of this drug within recent years. About seven years ago several hundredweights were sold at the rate of 37*s.* 6*d.*, that is, for about 4*d.* per pound. After the drug had been in stock for nearly two years, most of it was resold

for 16*l.* a hundredweight, that is, about 2*s.* 10*d.* a pound. Somewhat later the drug became very scarce, and the price gradually rose to 16*s.* per pound. At the present time the price is still high, Kino having been sold for 13*s.* per pound within the last few weeks. If, however, any large quantity of the drug were put on to the market, the probability is that the price would again fall to its average value of from 6*d.* to 1*s.* per pound. Having regard to the facts stated in Dr. Watt's letter, that Kino can be profitably collected at a cost of 8 annas per pound, and to the statements of the commercial experts referred to above, the most desirable course for the present would seem to be to place relatively small parcels of the drug periodically on the English market, without, however, greatly augmenting the exports to this country. If necessary, this Department would be glad to assist the Inspector-General of Forests in placing consignments with trustworthy brokers in this country.

WYNDHAM R. DUNSTAN.

14th June 1898.

APPENDIX K.

Report on Five specimens of Indian Food-grains.

1. Cicer soongaricum, Steph.

Synonyms. — *Cicer microphyllum, Benth; C. Jacquemontii, Jaub. and Spach.*

Vernacular.—*Tizhú, Jardáne, Banyarts, Sárri, Serri,* Panjab; *Siri safed,* Ladakh.

This species of chick-pea occurs in the Western Himalaya, in the temperate and alpine region. The plant is used as green fodder, the seeds as human food. These seeds are smaller than those of *C. arietinum*, and contain rather more woody fibre, but are richer in albuminoids and oil. The sample analysed came from the Wazir of Ladakh, through the British Resident of Kashmir. The seeds give these percentages :—

Water	9·0
*Albuminoids (from total nitrogen)	22·1
Starch, &c. (by difference)	47·3
Oil	6·7
Fibre	10·7
Ash	4·2

The nutriment-ratio is here 1 : 2·8 and the nutriment-value 84.

2. Phaseolus calcaratus, Roxb.

Synonyms.—*Phaseolus sublobatus, Wall.; P. hirtus, Wall.; P. pubescens, Blume; P. tarosus, Roxb.*

Vernacular.—*Sutri, Ghurúsh,* Hind.; *Sutri,* Santali; *Sita mas, Pau maia,* Nepal; *Gurúsh,* Panjab.

This bean, which is found wild and is cultivated throughout the tropical zone from the Himalaya to Ceylon, is nearly allied to *P. mungo.* It may be grown at a greater elevation than many other Indian pulses. The seeds analysed were from the Botanic Garden at Saharunpur.

The percentages obtained with the unhusked seeds were :—

Water	10 5
†Albuminoids (from total nitrogen)	21·7
Starch, &c. (by difference)	58·1
Oil	0·6
Fibre	5·2
Ash	3·9

The nutrient-ratio is here 1 : 2·7 and the nutrient-value 80.

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* 19·8 by phenol method.

† 20·1 by phenol method.

3. Lathyrus sativus, L.

Synonym.—*Cicercula alata, Moench.*

Vernacular.—*Khesári,* Hind.; *Khesari,* Beng.; *Kesari,* Santal, Nepal; *Kisári,* Panjab; *Gharas,* Ladakh.

Peculiar interest attaches to this vetchling from the toxic effects (paralysis, &c.) so frequently caused in animals, as well as in human beings, by the use of its seeds as food. Further research is needed in order to identify the poisonous principle, which is probably a volatile alkaloid susceptible of dissipation or destruction by heat. The sample analysed came from the Wazir of Ladakh through the British Resident of Kashmir. The unhusked seeds gave the following percentages :—

Water	11·1
*Albuminoids (from total nitrogen)	24·4
Starch, &c. (by difference)	55·3
Oil	1·0
Fibre	5·4
Ash	2·8

The nutrient-ratio is here 1 : 2·3, and the nutrient-value 82.

4. Pisum arvense, L.

Vernacular.—*Mattar rewari, Desi mattar, Chota mattar, Kulon,* Hind.; *Desi mattar, Chota mattar,* Beng.; *Kalon, Kulai batana,* N.-W. Pr.; *Korani, Karain,* Kashmir.

The small seeds of the common field-pea, grown on the Experimental Farm at Cawnpore, were submitted to analysis. They showed, on comparison with Indian-grown samples of the form usually called *Pisum sativum,* a considerably higher proportion of indigestible fibre. These percentages were obtained with the unhusked peas :—

Water	10·9
†Albuminoids (from total nitrogen)	22·1
Starch, &c. (by difference)	54·6
Oil	1·2
Fibre	8·6
Ash	2·6

The nutrient-ratio is here 1 : 2·6, and the nutrient-value 79.

5. Chenopodium album, L.

Synonyms.—*Chenopodium viride and C. ladiniatum, L.; C. nepalense, Hort., Monsp.; C. giganteum, Don.; C. purpurascens, Ham.*

Vernacular.—*Bathú sag, Chandan behí,* Beng. and Hind.; *Bathua, Bathua, Jauság, Limah,* Pb., Plains; *Irr,* Chenab Valley; *Em,* Ladakh, *Bethuiva, Jausag, Bhuhva,* N.-W. Pr.; *Chakurt,* Bomb.; *Jhil,* Sind; &c., &c.

This ubiquitous and variable "goosefoot" was mentioned in my "Food-grains of India," but no seeds were at the time available for analysis. A sample recently received from the Deputy-Commissioner of Lahore, gave the following percentages :—

Water	8·3
‡Albuminoids (from total nitrogen)	18·4
Starch, &c. (by difference)	19·2
Oil	21·1
Fibre	29·4
Ash	3·6

The nutrient-ratio is here 1 : 3·7, and the nutrient-value 86.

In spite of the high proportion of indigestible matter in these unhusked seeds, their analysis confirms the Indian opinion of their nutritious character.

A. H. CHURCH.

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* 22 by phenol method. † 18·3 by phenol method.
‡ 16·7 by phenol method.

Report on Four Indian Food-stuffs.

1. Cyanotis axillaris, Rœm. et Schulles.

Vernacular.—*Nirpulli*, Tam.; *Soltraj*, *Bagha-nulla*, Hind.; *Itsaka*, Bomb.

This annual, which belongs to the N. O. Commelinaceæ, is common in many parts of India. Though anything but promising in appearance, it has been used as food in times of famine. The seeds are spongy and light; 100 weigh only 4 grains. The sample received was largely charged with earthy matter which it was impracticable to remove entirely.

These percentages were obtained :—

Water	11·5
Albuminoids (from total nitrogen)	13·9
Starch, &c. (by difference)	64·1
Oil	0·5
Fibre	3·1
Ash (includes some sand)	6·9

The nutrient-ratio is here 1 : 4·6, the nutrient-value 79. By the phenol method 12·22 per cent. of albuminoids was shown.

After all, these poor-looking seeds possess a good nutrient ratio and a fair alimentary value.

2. Indigofera linifolia, Retz.

Vernacular.—*Torki*, Hind. and Pb.; *Bhangra*, Beng.; *Tandi Khode baha*, Santal; *Burburra*, *Pandhari pale*, *Bhangra*, *Torki*, Bomb.; *Pandhi*, Nasik; *Jawarich malmandi*, *Kaladgi*, Bomb.

The seeds of this common kind of wild indigo are eaten in times of scarcity and famine. They are a little smaller than those of *Indigofera glandulosa*. The percentages obtained were :—

Water	9·3
Albuminoids (from total nitrogen)	34·3
Soluble carbohydrates (by difference)	43·4
Oil	3·0
Fibre	6·5
Ash	3·5

The nutrient-ratio is here 1 : 1·47, the nutrient-value is 84. The phenol method showed 32·2 per cent. of albuminoids.

3. Indigofera glandulosa, Willd.

Vernacular. — *Vékhariyo*, Mar.; *Barbed*, Sholapur; *Gavacha malmandi*, *Kaladgi*, Bomb.; *Vékhariyo*, *Baragadam Barapatálu*, *Boomidapu*, Tel.

The seeds of this wild indigo are rather larger than that of *Indigofera cordifolia* and much resemble those of *Indigofera linifolia*. 100 seeds of the analysed sample weighed 4½ grains. These are the percentages obtained :—

Water	8·2
Albuminoids (from total nitrogen)	31·9
Soluble carbohydrates (by difference)	46·7
Oil	2·2
Fibre	7·8
Ash	3·2

The nutrient-ratio is here 1 : 1·6, and the nutrient-value 83. The percentage of albuminoids by the phenol method was 29·32.

4. Indigofera cordifolia, Heyne.

Vernacular. — *Vekriavas* (*Marwara*), Raj.; *Godadi*, *Bodaga*, *Botsaka*, Bomb.

The seeds of this wild indigo are eaten in times of scarcity and famine. They are very small, 100 weighing less than one grain. When suddenly

heated they "pop" like maize. On analysis these percentages were obtained:—

Water	6·1
Albuminoids (from total nitrogen)	30·8
Soluble carbohydrates (by difference)	46·0
Oil	1·3
Fibre	11·2
Ash	4·6

The nutrient-ratio is here 1 : 1·6 and the nutrient-value 79. The percentage of albuminoids by the phenol method was identical with the above given figure.

A. H. CHURCH.

APPENDIX L.

Report on Three Samples of Raji Tailings.

The following table presents the percentages obtained in the analysis of the three samples of Raji Tailings forwarded to me by the Imperial Institute in connexion with the letter, No. 3845, dated 18th July 1898, from the Inspector-General of Prisons, Madras:—

——	I.	II.	III.
Water	11·6	11·6	11·2
Albuminoids (from total nitrogen)	8·2	9·5	8·2
Starch, &c. (by difference)	71·2	68·7	71·8
Oil	1·1	2·0	1·7
Fibre	4·2	4·7	3·8
Ash	3·7	3·5	3·3
Albuminoids by phenol method	8·1	8·3	8·1
Nutrient-value	81	81	83
Nutrient-ratio	1 : 9	1 : 7·6	1 : 9·2

Sample I.—Raji that has been ground once and sifted once through a coarse wire-gauze sieve.

Sample II.—Raji that has been ground twice and sifted first through a coarse wire-gauze sieve, and, secondly, through a fine wire-gauze sieve.

Sample III.—Raji that has been ground twice and sifted twice through a fine wire-gauze sieve.

The three samples are obviously very much alike, though No. II. is richer in albuminoids (*i.e.*, "flesh-formers") than the others, and, consequently, shows a more favourable "nutrient-ratio," that is a better proportion of flesh-forming to heat and energy-giving constituents. Even in the case of No. II. a small addition of pulse is desirable.

In my "Food-grains of India" will be found analyses of whole and husked grain of Raji (*Eleusine Coracana*). There is also an analysis by Dr. McNally in the "Government of Madras Paper, No. 445, 1886." These older results do not diverge very widely from those now obtained with Raji tailings. I confess, however, that the figures which I now report, so far as the proportions of indigestible fibre are concerned, are unexpected. I thought it likely, from the appearance of the samples, that they would show a much higher percentage of this non-nutritious constituent than 4 or 5. But it must be borne in mind that the chemical method of treatment (with acid and alkali) used in determining fibre is a very drastic one, by no means equivalent to the action of the digestive juices, but greatly exceeding it. Two other considerations must also be kept in view. The fibre of these grains undoubtedly serves to lock up, and so to render unavailable a part of the albuminoids, a part of the oil or fat, and a part of the mineral matter present in these tailings. Again, the coarseness and roughness of the seed-coat of this millet cause this food-stuff to be hurried through the intestinal tract at such a rate that much of the nutrient matter, which might otherwise be absorbed, escapes digestion and assimilation, and is lost in the fæces. For these reasons the chemical figures I have given, convey a physiological impression of nutritive value greater than that which such a

food-stuff as this really possesses in alimentation. An experiment in artificial gastric and pancreatic digestion, which I have tried with Sample No. III., demonstrates this conclusion; but one cannot, in the laboratory and without actual feeding trials, complete the necessary correction, by ascertaining what proportions of the several nutrients will in practice escape digestion, in consequence of the too brief sojourn of the food-stuff in the intestines. I regret that I do not possess data enabling me to make a definite statement on this point. I should like to have been in a position to define the precise quantities of albuminoids, of starch and other carbo-hydrates, and of oil, which, in 1 lb. of Raji tailings, must be regarded as useless in nutrition.

In conclusion, I would refer the Inspector-General of Prisons, Madras, to the observations and tables relating to dietaries and rations to be found on pages 16 to 30 of my "Food-grains of India."

A. H. CHURCH.

APPENDIX M.

Memorandum on Para and Ceara Rubber, and on possible Rubber Substitutes.

Para Rubber from Burma.—The sample of Para rubber (Register No. 11,095) derived from *Hevea brasiliensis* and grown in the Mergui Experimental Gardens, Burma, has been submitted to well-known experts for valuation. One reports that it is a fairly clean sample of the Mollends type, value about 3*s.* 8½*d.* per pound. The other expert states that the sample is of fairly good quality, but not equal to genuine Para rubber, mainly on account of its containing partly decomposed "sticky" rubber. It is suggested that this deleterious constituent may have been derived from admixture with some other latex than that of *Hevea brasiliensis*. Its presence considerably reduces the value of the rubber, since it renders it unfit for the construction of cable and other similar purposes. Were it not for this and the fact that the sample has a strong acid reaction, which may not be easy to remove, the rubber itself is as pure as genuine Para. The value of the sample submitted may be put at between 2*s.* 6*d.* and 2*s.* 9*d.* per pound. It is clear from these two reports that those responsible for the collection of the specimens should be informed of its defects and asked to collect a new sample, taking, as far as possible, precautions against the inclusion of the impurities referred to. It seems probable that if the rubber were properly prepared, it might fetch as much as genuine Para rubber in the English market.

Ceara Rubber from Madras.—A report has been obtained from the same experts on the sample of Ceara rubber derived from *Manihot Glaziovii* (No. 10,178), grown in Coimbatore, Madras. Both the experts state that this sample is of inferior quality, that it has been badly prepared, containing a good deal of dirt and sand, and that apparently it has been heated. On account of these defects they do not think it would fetch more than 1*s.* 3*d.* to 1*s.* 6*d.* per pound in the market.

I wish to take this opportunity of drawing attention to the importance at the present time of examining any plants whose juices appear to coagulate with the production of a material more or less resembling rubber. The demand for this material is yearly increasing, and it is possible that by special methods of treatment several plants might be made to yield a product which, if it does not possess all the valuable properties of rubber, might at least be employed for several purposes for which rubber is now utilised. I shall be glad to receive, for examination in the Scientific Department, samples of any such juices, and I would ask that several pounds of each should be sent, and that they should include not merely the coagulum of rubber, but also the fluid out of which the material has separated. I should also be glad to receive some pounds of the entire latex, the coagulum and serum, from the Para and Ceara plants. From the chemical point of view it is most important that the constituents which do not coagulate should be examined as well as the coagulum itself.

WYNDHAM R. DUNSTAN.

9th January 1899.

Appendix N.

Report on a Sample of Rubber (*Ficus Elastica*) from the Charduar Plantation, Assam.

This sample of rubber is referred to in a letter from the Officiating Reporter on Economic Products to the Government of India, dated 29th September 1898, which enclosed a communication from the Deputy-Conservator of Forests, Darrang Division, Tezpur, Assam, stating that the rubber had been tapped experimentally in Compartments Nos. 2 and 3 of the Charduar plantation, and requesting that the Imperial Institute should obtain a valuation of the sample.

An inspection of the specimen showed that it had not been well collected or prepared, small pieces of wood and other extraneous matter were distributed through the mass, whilst certain portions appeared to have been damaged by heat. Two commercial reports have been obtained, one from a large manufacturing firm who extensively employ india rubber; they report that its quality is very poor, and that its value would only be about 1*s.* 6*d.* per pound delivered in this country. The second report is from a firm of rubber brokers, who state that the sample might realise 2*s.* 9*d.* per pound, but they remark that it has been badly treated, and that if it were sent in good condition it would be worth 3*s.* 2*d.* per pound.

In connexion with this matter it has been accidentally ascertained that the Inspector-General of Forests to the Government of India, Mr. B. Ribbentrop, has communicated direct with Messrs. Siemens, Brothers, & Co., Limited, the well-known manufacturing electricians, asking for a report on the same sample, stating that it could be seen at the Imperial Institute. It would be well in the future to avoid this double action being taken in respect to one and the same product on which the Government of India are desirous of obtaining information, as it is likely to occasion a good deal of unnecessary trouble, if not misunderstanding. In his letter to Messrs. Siemens, Brothers, & Co., Mr. Ribbentrop states that he is sending a consignment of about four tons of the Charduar rubber to this country during the present month. It is to be hoped that this rubber, which is now in the course of preparation, may be more carefully cleaned and treated than has been the case with the sample submitted to our experts.

If the consignment were sent to the Imperial Institute with instructions to obtain several valuations we should be glad to assist in the matter by obtaining these, and, if desired, to accept for the Forest Department the highest tender for the consignment.

WYNDHAM R. DUNSTAN.

7th February 1899.

Appendix O.

Report on Samples of Mica from Jeypore.

The samples of mica referred to by the Officiating Reporter on Economic Products to the Government of India in his letter, No. 2946/184 F. S., dated the 8th November 1898, which enclosed a letter from the Resident of Jeypore requesting a report on the value of the mica found in that district, have been examined. The mica experts report that the samples are quite worthless, their chief defect being that they are striated, or cross-grained, and much cracked. This kind of mica is only adapted for electrical purposes. The Dewan of Kishengarh is mistaken in supposing that this mica is similar to the mica of Behar, since the product derived from that district is the fine clear "ruby mica" which is so largely employed for the construction of chimneys for stoves and lamps. The samples of Jeypore mica appear to have been taken from the surface outcrop, and the experts consider that it is quite likely that, if properly mined, better samples could be obtained. In order to furnish the authorities in Jeypore with precise information as to the characters of the best quality of black spotted mica, I send herewith a number of specimens of the material which command the best prices in the English market. It should be borne in mind that at the present time there is a very

considerable supply of small spotted mica. which is employed for electrical purposes. There is, however, a great demand for uncracked large plates over eight inches in length, the width being immaterial. Prices ranging up to about 12 shillings per pound have been obtained for mica plates three to seven inches wide and from 16 to 20 inches long. I also append the following general remarks on the subject of mica, which have been made by our mica experts.

"Mica taken from the surface is usually decomposed and of no value, but the out-turn frequently becomes more satisfactory as deeper levels are reached. There is also a great loss in weight attending mining operations, due to inferior, buckled, and cross-grained slabs, and this loss ranges generally from 50 per cent. to 90 per cent. of the out-turn. Where labour is cheap the mica should be cleaned, split, and trimmed where found, and packed in boxes not exceeding 100 lbs. in weight.

"The requirements in this article are that the plates or sheets should be smooth, quite flat, and of an even and uniform thickness of about $\frac{1}{8}$-inch. They should be roughly trimmed, square or oblong (no plate to have more than five sides), with edges cleanly cut; plates of precise dimensions are unnecessary until the quality of the mica has been found to be suitable for its sale as 'cut mica.' It is very important that the plates should split easily, therefore all cross-grained, ridged, or buckled plates must be discarded, and all cracks or flaws carefully removed from all mica sent forward for sale. Care should also be exercised not to pack in the same case plates of mica varying more than one inch in either length or breadth.

"Colour is immaterial; it may be white, ruby, amber, green, black, or yellow, spotted or stained; each variety is useful for different purposes, but mica of clear pale green, or clear ruby colour is the most valuable.

"There is practically no sale for plates of less than two inches in width, and but little demand for plates over 10 inches in width, but the plates increase in value with their length, the smallest merchantable dimension being three inches.

"Samples sent for valuation should be at least 50 lbs. in weight."

WYNDHAM R. DUNSTAN.

8th February 1899.

SELECTIONS from CORRESPONDENCE ("FLYING SEAL" and "DIRECT") between IMPERIAL INSTITUTE and INDIAN OFFICERS, 1898-9.

A.

From Sir Frederick Abel, Bart., K.C.B., Director and Secretary, Imperial Institute, to Dr. George Watt, M.B., C.M., C.I.E., Reporter on Economic Products to the Government of India.

No. 455/4.

(Flying Seal Series, No. 158.) Imperial Institute, London,
16th November 1898.

Sir,

I have the honour to forward, for your information, two memoirs, the first, reprinted from the "Philosophical Transactions of the Royal Society," on "the Pharmacology of Aconitine, Diacetyl-aconitine, Benzaconine, and Aconine, considered in relation to their chemical constitution," by Professor Cash and Professor Dunstan, the Director of the Scientific Department of the Imperial Institute; the other, reprinted from the "Edinburgh Medical Journal," on "the Physiological Action and Therapeutic Properties of Podophyllin, with special reference to Indian Podophyllin," by Dr. Mackenzie and Dr. Dixon, of St. Thomas's Hospital.

The paper by Professors Cash and Dunstan is a comprehensive account of the physiological action of Aconitine derived from *Aconitum Napellus*. These authors intend later to give an account of the physiological action of the alkaloids of other species of Aconite, with special reference to those occurring in India, and the present paper is of importance as establishing the standard by which the physiological action of these different alkaloids may be compared.

The work described by Drs. Mackenzie and Dixon on Podophyllin was undertaken at Professor Dunstan's suggestion, with the view of determining the physiological action and therapeutic effects of the substances isolated in the course of the chemical investigation of Indian Podophyllum, which has recently been carried out in the Scientific Department of the Imperial Institute, the results of which are fully described in the paper, published in the "Journal of the Chemical Society," on the constituents of Indian Podophyllum, by Professor Dunstan and Mr. Henry, a copy of which has already been forwarded to you. You will observe that the conclusions arrived at by Drs. Mackenzie and Dixon are entirely favourable to the use of Indian Podophyllin in medicine, and they point out that it is an effective substitute for the American Podophyllin derived from *Podophyllum peltatum*, which, as a matter of fact, is only about one-half as physiologically effective as the Indian drug.

I trust that it will be possible to follow up the results of these physiological and chemical investigations with the view of utilising this Indian product.

I have, &c.

F. A. ABEL.

B.

From Dr. George Watt, C.I.E., to Sir Frederick Abel, Bart.

Ban Reha.

No. 994/75 F.S.

Indian Museum,
1, Sudder Street, Calcutta,
28th April 1898.

Sir,

I am sending to the address of Mr. Royle, our Curator at the Imperial Institute, a consignment of Ban Reha fibre. This article has been spasmodically discussed for the past 50 years, but only in a superficial way. Various writers have extolled the merits of the fibre, but no practical tests have been performed and no progress made. Moreover, as the word Ban Reha means wild Rhea, various writers have spoken of Reha and China grass as indigenous to India, and have created false hopes as to our limitless resources in that fibre. During my explorations in Assam I gave special consideration to the Ban Reha. I found, as I had suggested in the "Dictionary of Economic Products," that while related no doubt to *Bœhmeria nivea* it was a perfectly distinct plant, namely, *Villebrunea integrifolia*. The explanation of the name Ban Reha, as it seems to me, may be the reverse to that generally supposed. This is a truly wild plant, and to this day is nowhere cultivated, though its fibre is highly appreciated and regularly utilised by the hill tribes of Assam. On the Chinese grass cloth being introduced, it was somehow or other recognised as related to the indigenous plant, and accordingly received the old name of Reha, the wild plant being spoken of as the wild Reha. Certainly *Bœhmeria nivea* and its variety *B. tenacissima* are not indigenous to India, and are nowhere even sufficiently naturalised to exist as escapes from cultivation. Reha means, in Assamese, the cloth that covers the heart or breast. I have reason to believe shawls made of the Ban Reha may have originally been so designated. The word is Reha, not Rhea, and is pronounced Ree-ha.

2. But to turn from these general statements and opinions to the important aspects of the subject. *Villebrunea* can be grown on all waste lands; it has little or no gum, will give a high return where Reha fails; it is a very fine fibre, and perhaps as strong, if not stronger, than China grass. On these considerations I am to make an effort to bring this fibre to the attention of commerce, and I shall be very grateful if you can see your way to secure the co-operation of the officers of the Scientific Department. Mr. Royle will hand over to you three-quarters of the present consignment. I desire to have the fibre examined both chemically and industrially. For the latter purpose I shall be pleased to send a larger consignment on my hearing from you. All

that has been done is to strip the ribbons off the stems. These have not been cleaned in any way, and the loss no doubt will be found serious. The plant produces shoots 20 feet long; the bark strips off easily, but no doubt machinery could be readily designed to produce a cleaned and partly bleached raw fibre. The most important point in connexion with this fibre is that it could be produced at a third the price of Reha. I trust, with all these facts before you, that you may see your way to co-operate with me in the effort to give to India a perfectly new commercial fibre.

I have, &c.
GEORGE WATT.

No. 1002/43 F.S.

Malabar Kino.

Indian Museum,
1, Sudder Street, Calcutta,
29th April 1898.

Sir,

With reference to Inquiry No. 65 in the Programme of Collections, 1897–8, I have the honour to append herewith, copy of Letter No. 254, dated the 17th March 1898, from the Inspector-General of Forests to the Government of India, and to advise the despatch, by parcel post, of 1 lb. of true gum Kino (Registration No. 10,455), furnished therewith. I have to ask if you would be so good as to procure for this Office from experts an expression of opinion as to the market value of the product.

2. You may be aware that Malabar Kino has become rather scarce, and the price has risen considerably during the last year or two. I have reason to believe that the rate 15*s.* per lb. at which it has been selling at London lately, is fictitious, and due to the article being held back by one or more interested firms.

3. Kino may be profitably collected at a cost of 8 annas per lb., and its market value a few years ago in Bombay was 2½ annas per lb. By independently placing a small parcel on the London market you would be able to ascertain the present demand and the real value of the drug. From the letter in question you will see that 2,000 lbs. of absolutely genuine Kino is annually procurable in North Malabar.

4. A reply at your early convenience would greatly oblige.

I have, &c.
GEORGE WATT.

Enclosure to above.

Copy of Letter No. 254, dated the 17th March 1898, from the Inspector-General of Forests to the Government of India to the Reporter on Economic Products to the Government of India.

I have the honour to forward to you a sample of true gum Kino, and request that you will be good enough to have it offered in the London market through the agency of the Imperial Institute.

2. I found, when on tour, that the Divisional Officer, North Malabar, had sent samples to Messrs. Burgoyne and Burbidge, and that these gentlemen had declared the gum not to be the true gum Kino, and had valued it at 3*s.* per lb. The fact is, that the trade at home but rarely sees the Kino in an unadulterated state, as it is, as a rule, mixed with the gum of *Bombax* and minute particles of bark. Seeing this I undertook to place the samples before you in order to obtain offers from the London market for the pure article, of which we can supply a considerable quantity from Malabar, Bombay, Berar, the Central Provinces, &c.

3. Comparing the Kino sample now sent with pattern samples I have, I find that it consists of shade and sun-dried gum in mixture. The sun-dried Kino is slightly more appreciated in the market, and of course arrangements can easily be made to prepare it all in this way.

4. I had the opportunity of showing my patterns to an agent of manufacturing chemists in Detroit, United States of America. He declared it to be the best Kino he had seen, and valued it at about 11*s.* per lb. in the gross. Even this, however, seems to be low, as the stuff prepared for the market, mixed with much less valuable substances, fetches 15*s.* to 18*s.* in the retail trade.

5. You will observe that North Malabar can supply 2,000 lbs. per annum as per sample.

From D. Hooper, Esq., to Sir Frederick Abel, Bart.

No. 1370/110 F.S.

Edible Oils.

Indian Museum,
1, Sudder Street, Calcutta,
9th June 1898.

Sir,

With reference to Letter No. 102/4 (F. S. S. No. 135), dated the 12th March 1898, I have the honour to send you all the information I possess regarding the edible oils (Imperial Institute Programme No. 47) collected for the Scientific Department.

In very few cases is the method of extracting the oil described in detail, since the country oil-mill ("*Kolhu*") was generally used, and its mechanism is supposed to be thoroughly understood. The "*Kolhu*" is composed of two parts; the mortar, which is fixed, containing the seed, a piece of wood like a large pestle which is made to rotate inside the mortar and crush the contents. The mortar is constructed of stone or wood, and the pestle is worked by one or two bullocks according to the size of the mill. The seeds are decorticated and placed in the mortar-like vessel, they are then ground to a paste, and the oil, as it separates, is allowed to run off through an aperture below. The oil is decanted from dregs, if there are any, but no process of filtering is resorted to.

The total weight of oil and oil-cake often exceeds the weight of the seeds taken to supply the mill; this is due to the employment of small quantities of water to facilitate the disengagement of the oil.

A difficulty was experienced in one or two cases where the oil had a thick consistence at ordinary temperatures and could not readily be separated in the usual way. The Forest Ranger, Koderma, Bengal, for instance, heated the powdered kernels of *Buchanania latifolia* in an earthen pot by placing it over another pot in which water was kept boiling. The pasty mass was taken out, placed in a bag, and pressed firmly between two planks. This crude process occasioned a fairly satisfactory yield of oil. At another instance, in Rajamundry, Madras, the kernels of *B. latifolia* were boiled with water, and the oil which rose and collected on the surface was removed.

In Bahraich, North-Western Provinces, the addition of hot water to *Buchanania* seeds, as they were being pressed in the mill, was found to promote the separation of oil.

This is all the information I am able to give you with regard to the processes adopted by the various officials who have supplied the samples of seeds, oil, and oil-cake.

In conclusion, I have the honour to append two statements: the first shows the actual proportions of oil yielded by most of the collections; the second gives a complete list of all the samples collected by this Department for the Imperial Institute.

I have, &c.

Sir Frederick A. Abel, Bart., K.C.B. D. HOOPER.

Percentage yield of Oil from various Indian Seeds, samples of which have been supplied to the Scientific Department, Imperial Institute.

Bassia latifolia (Mahua) :—	
Cawnpur, North-Western Provinces	27·0
North-Western Provinces	28·3
Central Provinces	30·7
Dumraon, Bengal	33·3
Bombay	37·7
B. longifolia (Illippe) ;—	
Coimbatore, Madras	18·0
Tanjore, Madras	46·0 (estimated).
Brassica species :—	
White mustard (*B. alba*), Bengal	33·6
Black mustard (*B. nigra*), Bengal	28·5
Lutni (*B. napus* var. *oleifera*), Bengal	32·5
Rai (*B. juncea*), Bengal	22·2
Toria (*B. campestris*), Umballa, Punjab	33·3
Mustard (*B. juncea* ?), Central Provinces	26·4
B. napus (yellow), Bombay	40·0
B. napus (brown), Bombay	36·4
B. juncea, Bombay	21·1
Buchanania latifolia (Chironji, pial) :—	
Koderma, Bengal	25·0
Narsinghapur, Central Provinces	25·0
Nimar, Central Provinces	27·7
Bundelkhand, North-Western Provinces	30·3
Bahraich, North-Western Provinces	37·0
,, ,, ,,	39·6
,, ,, ,,	40·0
Carthamus tinctorius (Safflower) : —	
Central Provinces	23·7
Cocos nucifera :—	
Bengal	52·3
Bombay	57·1
Eruca sativa (Taramira) :—	
Umballa, Punjab	12·5
Bombay	25·0
North-Western Provinces	25·3
Garcinia indica (Kokam) :—	
Bombay	33·3
Guizotia abyssinica (Ramtil, Niger seed) :—	
Bombay	23·8
Bengal	26·0
Central Provinces	27·5
Juglans regia (Walnut) :—	
Punjab	50·0
Linum usitatissimum (Linseed) :—	
Central Provinces	28·2
Olea cuspidata (Zaitun) :—	
Punjab	11·2
Papaver somniferum (Poppy) :—	
Bengal	33·3
North-Western Provinces	39·6
Umballa, Punjab	47·0

Register of Collections of Edible Oils sent to the Imperial Institute.

Registration No.	Section and Serial No.	Date of Receipt.	Description of Article and Name of Province.	Quantity.	Price paid, if purchased, also Freight, Coolie Hire, &c.	Action taken.
			FROM DEPUTY COLLECTOR OF TANJORE, THROUGH THE REVENUE SECRETARY AND DIRECTOR, LAND RECORDS AND AGRICULTURE, MADRAS.		R. A. P.	
6815	—	—	*Anacardium occidentale*, nuts -	10 lbs.	—	I. I. Invoice, No. 15 of 1896.
6816	—	—	*Ditto* oil -	2 gallons	—	Ditto.
			FROM GOVERNMENT FARM, CAWNPUR.			
7059	—	—	*Bassia butyracea*, oil - -	21 lbs.	—	I. I. Invoice, No. 22 of 1896.
			FROM CALCUTTA OIL MERCHANT.			
6330	—	—	*Bassia latifolia*, oil - - -	1 tin	—	I. I. Invoice, No. 10 of 1895.
			FROM DUMRAON FARM.			
6452	—	—	*Bassia latifolia*, oil - - -	20 lbs.	—	I. I. Invoice, No. 13 of 1895.
6453	—	—	*Ditto* nuts - -	10 lbs.	—	Ditto.
6454	—	—	*Ditto* oil-cake - -	39 lbs.	—	Ditto.
			FROM GOVERNMENT FARM, CAWNPUR.			
8544	—	—	*Bassia latifolia*, seeds - - -	10 lbs.	—	Ditto.
6545	—	—	*Ditto* oil - - -	2 gallons	—	Ditto.
6546	—	—	*Ditto* oil-cake - -	10 lbs.	—	Ditto.
			FROM COLLECTOR OF BELLARY.			
6633	—	—	*Bassia latifolia*, seeds, husked -	10 lbs.	—	Ditto.
6634	—	—	*Ditto* oil - - -	2 gallons	—	Ditto.
6635	—	—	*Ditto* oil cake - -	10 lbs.	—	Ditto.
			FROM CENTRAL PROVINCES.			
6744	—	—	*Bassia latifolia*, oil - - -	30 lbs.	—	I. I. Invoice, No. 15 of 1895.
6745	—	—	*Ditto* refuse oil-cake -	30 lbs.	—	Ditto.
			FROM COIMBATORE, MADRAS.			
6749	—	—	*Bassia latifolia*, seeds - - -	14 lbs.	—	Ditto.
6750	—	—	*Ditto* oil - - -	12 bottles	—	Ditto.
6751	—	—	*Ditto* oil-cake - -	27 lbs.	—	Ditto.
			FROM DEPUTY COMMISSIONER, LAHORE.			
6963	—	—	*Bassia latifolia*, seeds - -	12 lbs.	—	Ditto, and No. 17 of 1896.
			SURVEY COMMISSIONER, BOMBAY.			
7757	—	—	*Bassia latifolia*, oil - - -	18 lbs.	—	I. I. Invoice, No. 22 of 1896.
			FROM COMMISSIONER OF SETTLEMENTS AND DIRECTOR, LAND RECORDS AND AGRICULTURE, CENTRAL PROVINCES.			
8396	—	—	*Bassia latifolia*, seeds - - -	10 lbs.	—	Ditto.
8397	—	—	*Ditto* seeds - - -	1 lb.	—	Ditto.
8398	—	—	*Ditto* oil - - -	14–7	—	Ditto.
8399	—	—	*Ditto* oil-cake - -	2 tins	—	Ditto.
			FROM TAHSILDAR OF TANJORE.			
6977	—	—	*Bassia longifolia*, oil - - -	2 gallons	—	I. I. Invoice, No. 20A of 1896, and Invoice, No. 22 of 1896.
6978	—	—	*Ditto* oil-cake - -	20 lbs.	—	Ditto.
6979	—	—	*Ditto* kernels - -	10 lbs.	—	Ditto.

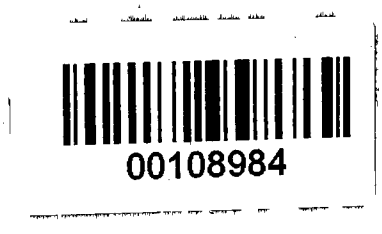
Registration No.	Section and Serial No.	Date of Receipt.	Description of Article and Name of Province.	Quantity.	Price paid, if purchased, also Freight, Coolie Hire, &c.	Action taken.
			FROM GOLAGHAT MILLS.			
6359	—	—	*Brassica juncea*, seeds - - -	12 lbs.	—	I. I. Invoice, No. 13 of 1895.
6360	—	—	*Ditto* oil - - -	20 lbs.	—	Ditto.
6361	—	—	*Ditto* oil-cake -	50 lbs.	—	Ditto.
			FROM DIRECTOR, LAND RECORDS AND AGRICULTURE, BENGAL.			
6373	—	—	*Brassica alba*, seeds - - -	20 lbs.	—	Ditto.
6374	—	—	*Ditto* oil - - -	40 lbs.	—	Ditto.
6375	—	—	*Ditto* oil-cake - - -	40 lbs.	—	Ditto.
6376	—	—	*Brassica nigra*, seeds - - -	10 lbs.	—	Ditto.
6377	—	—	*Ditto* oil - -	40 lbs.	—	Ditto.
6378	—	—	*Ditto* oil-cake - -	40 lbs.	—	Ditto.
6379	—	—	*Brassica campestris*, seeds - -	10 lbs.	—	Ditto.
6380	—	—	*Ditto* oil - -	40 lbs.	—	Ditto.
6381	—	—	*Ditto* oil-cake -	40 lbs.	—	Ditto.
6382	—	—	*Brassica juncea*, seeds - -	10 lbs.	—	Ditto.
6383	—	—	*Ditto* oil - - -	40 lbs.	—	Ditto.
6384	—	—	*Ditto* oil-cake - -	40 lbs.	—	Ditto.
			FROM GOVERNMENT FARM, CAWNPUR.			
6431	—	—	*Brassica campestris* var. *glauca*, seeds.	10 lbs.	—	Ditto.
6432	—	—	*Ditto* oil -	2 gallons	—	Ditto.
6433	—	—	*Ditto* oil-cake	33 lbs.	—	Ditto.
6434	—	—	*Ditto* var. *dichotoma* seeds	10 lbs.	—	Ditto.
6435	—	—	*Ditto* oil -	2 gallons	—	Ditto.
6436	—	—	*Ditto* oil-cake	34 lbs.	—	Ditto.
6437	—	—	*Ditto* red seeds	10 lbs.	—	Ditto.
6438	—	—	*Ditto* oil -	2 gallons	—	Ditto.
6431	—	—	*Ditto* oil-cake -	34 lbs.	—	Ditto.
			FROM THE DEPUTY COMMISSIONER, UMBALLA, PUNJAB.			
7152	—	—	*Brassica campestris*, seeds -	10 lbs.	—	I. I. Invoice, No. 22 of 1896.
7153	—	—	*Ditto* oil - - -	2 gallons	—	Ditto.
7154	—	—	*Ditto* oil-cake -	46 lbs.	—	Ditto.
			FROM COMMISSIONER OF SETTLEMENTS AND AGRICULTURE, CENTRAL PROVINCES.			
7620	—	—	*Brassica nigra*, seeds - - -	10 lbs.	—	I. I. Invoice, No. 20A of 1896.
7620A	—	—	*Ditto* oil - - -	1 tin	—	I. I. Invoice, No. 22 of 1896.
7620B	—	—	*Ditto* oil-cake - - -	1 tin	—	Ditto.
			FROM SURVEY COMMISSIONER, BOMBAY.			
7758	—	—	*Brassica campestris*, yellow variety, seeds.	10 lbs.	—	I. I. Invoice, No. 22 of 1896.
7758A	—	—	*Ditto* oil -	20 lbs.	—	Ditto.
7758B	—	—	*Ditto* oil-cake	30 lbs.	—	Ditto.
7759	—	—	*Ditto* brown variety, seeds.	10 lbs.	—	Ditto.
7759A	—	—	*Ditto* oil -	20 lbs.	—	Ditto.
7759B	—	—	*Ditto* oil-cake	30 lbs.	—	Ditto.
7760	—	—	*Brassica juncea*, seeds - -	10 lbs.	—	Ditto.
7760A	—	—	*Ditto* oil - - -	20 lbs.	—	Ditto.
7760B	—	—	*Ditto* oil-cake - -	30 lbs.	—	Ditto.
			FROM CONSERVATOR OF FORESTS, BUNDELKHAND DIVISION, JHANSI.			
6642	—	—	*Buchanania latifolia*, seeds -	10 lbs.	—	I. I. Invoice, No. 14 of 1895.
6643	—	—	*Ditto* oil - -	2 gallons	—	Ditto.
6644	—	—	*Ditto* oil-cake -	35¼ lbs.	—	Ditto

Registration No.	Section and Serial No.	Date of Receipt.	Description of Article and Name of Province.	Quantity.	Price paid, if purchased, also Freight, Coolie Hire, &c.	Action taken.
			FROM ASSISTANT CONSERVATOR OF FORESTS, BAHRAICH DIVISION, NORTH-WESTERN PROVINCES.			
8031	—	—	*Buchanania latifolia*, oil-cake -	16¼ lbs.	—	I. I. Invoice, No. 22 of 1896.
8032	—	—	*Ditto* oil - -	8 bottles	—	Ditto.
			FROM COMMISSIONER OF SETTLEMENTS AND AGRICULTURE, CENTRAL PROVINCES.			
8400	—	—	*Buchanania latifolia*, seeds -	10 lbs.	—	I. I. Invoice, No. 22 of 1896.
8401	—	—	*Dttto* oil-cake -	1 tin	—	Ditto.
			FROM DIVISIONAL FOREST OFFICER, BHANDARA, CENTRAL PROVINCES.			
8687	—	—	*Buchanania latifolia*, seeds - -	2 lbs. 1 ozs.	—	I. I. Invoice, No. 13 of 1897.
			FROM ASSISTANT CONSERVATOR OF FORESTS, GONDA DIVISION.			
9363	—	—	*Buchanania latifolia*, seeds - -	2 lbs.	—	Ditto.
			FROM DIVISIONAL FOREST OFFICER, NIMAR, THROUGH CONSERVATOR OF FORESTS, NORTHERN CIRCLE, CENTRAL PROVINCES.			
9368	—	—	*Buchanania latifolia*, oil - -	1 bottle	—	I. I. Invoice, No. 31 of 1897.
			FROM OFFICER IN CHARGE, BUNDELKHAND DIVISION, JHANSI.			
9425	—	—	*Buchanania latifolia*, seeds -	2 lbs.	—	I. I. Invoice, No. 26 of 1897.
			FROM SUB-DIVISIONAL OFFICER, POONA, BOMBAY.			
9725	—	—	*Buchanania latifolia*, seeds - -	2 lbs.	—	Ditto.
			FROM FOREST RANGER, KODERMA, HAZARIBAGH.			
9727	—	—	*Buchanania latifolia*, seeds - -	2 lbs.	—	Ditto.
9727-1	—	—	*Ditto* - - -	1 quart	—	I. I. Invoice, No. 31 of 1897.
			FROM DEPUTY CONSERVATOR OF FORESTS, GORAKHPUR, NORTH-WESTERN PROVINCES.			
9828	—	—	*Buchanania latifolia*, seeds - -	4 lbs.	—	I. I. Invoice, No. 1 of 1898.
			FROM DEPUTY CONSERVATOR OF FORESTS, SCHOOL CIRCLE, DEHRA DUN.			
9836	—	—	*Buchanania latifolia*, oil - -	1 pint	—	I. I. Invoice, No. 31 of 1897.
			FROM CONSERVATOR OF FORESTS, CENTRAL CIRCLE, MADRAS.			
9982	—	—	*Buchanania latifolia*, seeds -	2 lbs.	—	I. I. Invoice, No. 1 of 1898.
9984	—	—	*Ditto* oil - -	2 ozs.	—	To be sent.
			FROM DIVISIONAL FOREST OFFICER, W. KHANDESH, BOMBAY.			
10,060	—	—	*Buchanania latifolia*, seeds -	2 lbs.	—	I. I. Invoice, No. 1 of 1898.

Registration No.	Section and Serial No.	Date of Receipt.	Description of Article and Name of Province.	Quantity.	Price paid, if purchased, also Freight, Coolie Hire, &c.	Action taken.
			FROM DIVISIONAL FOREST OFFICER, BAHRAICH, NORTH-WESTERN PROVINCES.			
10,225	—	—	*Buchanania latifolia*, oil - -	4 bottles	—	To be sent.
10,227	—	—	*Ditto* seeds - -	6 lbs.	—	I. I. Invoice, No. 1 of 1898.
			DISTRICT FOREST OFFICER, NELLORE.			
10,350	—	—	*Buchanania latifolia*, seeds - -	2 lbs.	—	Ditto.
			FROM DEPUTY COMMISSIONER, HOSHIARPUR DISTRICT, PANJAB.			
6296	—	—	*Carthamus tinctorius*, oil - -	22½ lbs.	—	I. I. Invoice, No. 13 of 1895.
6297	—	—	*Ditto* oil-cake -	20 lbs.	—	Ditto.
6298	—	—	*Ditto* seeds -	12 lbs.	—	Ditto.
6299	—	—	*Ditto* oil - -	12 ozs.	—	Ditto.
6300	—	—	*Ditto* oil-cake -	10 lbs.	—	Ditto.
6301	—	—	*Ditto* seeds -	5 lbs.	—	Ditto.
			FROM DEPUTY COMMISSIONER, UMBALLA DISTRICT, PANJAB.			
6455	—	—	*Carthamus tinctorius*, seeds -	1 lb.	—	Ditto.
6457	—	—	*Ditto* oil - -	17 lbs.	—	Ditto.
6458	—	—	*Ditto* oil-cake -	7 lbs.	—	Ditto.
			FROM SUPERINTENDENT, LAND RECORDS AND AGRICULTURE, SIND.			
6525	—	—	*Carthamus tinctorius*, seeds - -	5 seers	—	Ditto.
6526	—	—	*Ditto* oil - -	3 gallons	—	Ditto.
			FROM SURVEY COMMISSIONER AND DIRECTOR, LAND RECORDS AND AGRICULTURE, BOMBAY.			
6624	—	—	*Carthamus tinctorius*, oil - -	5 gallons	—	Ditto.
6625	—	—	*Ditto* oil - -	5 gallons	—	Ditto.
6626	—	—	*Ditto* seeds - -	56 lbs.	—	Ditto.
6627	—	—	*Ditto* seeds - -	56 lbs.	—	Ditto.
6628	—	—	*Ditto* oil-cake -	5 lbs.	—	Ditto.
6629	—	—	*Ditto* oil-cake -	56 lbs.	—	Ditto.
6630	—	—	*Ditto* oil-cake -	56 lbs.	—	Ditto.
			FROM COLLECTOR OF BELLARY, THROUGH BOARD OF REVENUE, MADRAS.			
6681	—	—	*Carthamus tinctorius*, seeds - -	80 lbs.	—	I. I. Invoice, No. 14 of 1895.
6682	—	—	*Ditto* oil - -	3 bottles	—	Ditto.
6683	—	—	*Ditto* oil-cake -	30 lbs.	—	Ditto.
			FROM GOVERNMENT FARM, CAWNPUR.			
6784	—	—	*Carthamus tinctorius*, seeds - -	60 lbs.	—	I. I. Invoice, No. 15 of 1895.
6785	—	—	*Ditto* oil - -	5 gallons	—	Ditto.
6786	—	—	*Ditto* oil-cake -	7½ lbs.	—	Ditto.
6787	—	—	*Ditto* oil - -	5 gallons	—	Ditto.
6788	—	—	*Ditto* oil-cake -	80 lbs.	—	Ditto, and No. 17 of 1896.
6946	—	—	*Ditto* seeds - -	60 lbs.	—	Ditto.
			FROM COMMISSIONER OF SETTLEMENTS, NAGPUR, CENTRAL PROVINCES.			
7623	—	—	*Carthamus tinctorius*, seeds - -	6 lbs. 11 ozs.	—	I. I. Invoice, No. 22 of 1896.
7623A	—	—	*Ditto* oil - -	9 lbs.	—	Ditto.
7623B	—	—	*Ditto* oil-cake -	17 lbs. 12 ozs.	—	Ditto.

Registration No.	Section and Serial No.	Date of Receipt.	Description of Article and Name of Province.	Quantity.	Price paid, if purchased, also Freight, Coolie Hire, &c.	Action taken.
			FROM DUMRAON FARM, THROUGH DIRECTOR, LAND RECORDS AND AGRICULTURE, BENGAL.			
8318	—	—	*Carthamus tinctorius*, seeds - -	3 lbs.	—	I. I. Invoice, No. 22 of 1896.
8319	—	—	*Ditto* oil (pressed) -	30 lbs.	—	Ditto.
8320	—	—	*Ditto* oil (distilled)	30 lbs.	—	Ditto.
			FROM DIRECTOR, LAND RECORDS AND AGRICULTURE, BURMA.			
9104	—	—	*Carthamus tinctorius*, seed - -	2 lbs. 8 ozs.	—	I. I. Invoice, No. 11 of 1897.
9104A	—	—	*Ditto* seed - -	13 ozs.	—	Ditto.
9104B	—	—	*Ditto* seed - -	2 lbs. 10 ozs.	—	Ditto.
9104C	—	—	*Ditto* seed - -	3 ozs.	—	Not sent.
9104D	—	—	*Ditto* seed - -	2 lbs. 7 ozs.	—	I. I. Invoice, No. 11 of 1897.
9104E	—	—	*Ditto* seed - -	6 ozs.	—	Not sent.
9153	—	—	*Ditto* seed - -	1 lb.	—	I. I. Invoice, No. 11 of 1897.
9154	—	—	*Ditto* seed - -	1 lb.	—	Ditto.
10,048	—	—	*Ditto* seed - -	3 lbs.	—	Not sent.
			FROM GOLAGHAT MILLS.			
6364	—	—	*Cocos nucifera*, dried kernel -	10 lbs.	—	I. I. Invoice, No. 13 of 1895.
6365	—	—	*Ditto* oil - - -	20 lbs.	—	Ditto.
6366	—	—	*Ditto* oil-cake - - -	20 lbs.	—	Ditto.
			FROM MALABAR DISTRICT.			
6604	—	—	*Cocos nucifera*, kernel - -	10 lbs.	—	Ditto.
6605	—	—	*Ditto* oil - - -	10 lbs.	—	Ditto.
6606	—	—	*Ditto* oil-cake - -	10 lbs.	—	Ditto.
			FROM SURVEY COMMISSIONER AND DIRECTOR, LAND RECORDS AND AGRICULTURE, BOMBAY.			
7761	—	—	*Cocos nucifera*, kernel - -	10 lbs.	—	I. I. Invoice, No. 22 of 1896.
7761A	—	—	*Ditto* oil - - -	10 lbs.	—	Ditto.
7761B	—	—	*Ditto* oil-cake - -	8½ lbs.	—	Ditto.
			FROM GOVERNMENT FARM, CAWNPUR.			
6489	—	—	*Eruca sativa*, seeds - - -	10 lbs.	—	I. I. Invoice, No. 13 of 1895.
6490	—	—	*Ditto* oil - - -	2 gallons	—	Ditto.
6491	—	—	*Ditto* oil-cake - - -	60 lbs.	—	Ditto.
			FROM DEPUTY COMMISSIONER, UMBALLA, PUNJAB.			
7149	—	—	*Eruca sativa*, seeds - -	10 lbs.	—	I. I. Invoice, No. 22 of 1896.
7150	—	—	*Ditto* oil - - -	2 gallons	—	Ditto.
7151	—	—	*Ditto* oil-cake - - -	42 lbs. 8 ozs.	—	Ditto.
			FROM SURVEY COMMISSIONER AND DIRECTOR, LAND RECORDS AND AGRICULTURE, BOMBAY.			
7762	—	—	*Eruca sativa*, seeds - -	10 lbs.	—	Ditto.
7762A	—	—	*Ditto* oil - - - -	20 lbs.	—	Ditto.
7762B	—	—	*Ditto* oil-cake - -	55 lbs.	—	Ditto.
			FROM SURVEY COMMISSIONER AND DIRECTOR, LAND RECORDS AND AGRICULTURE, BOMBAY.			
7763	—	—	*Garcinia indica*, seeds - -	10 lbs.	—	Ditto.
7763A	—	—	*Ditto* oil - - -	20 lbs.	—	Ditto.
7763B	—	—	*Ditto* oil-cake - -	8 lbs.	—	Ditto.

Registration No.	Section and Serial No.	Date of Receipt.	Description of Article and Name of Province.	Quantity.	Price paid, if purchased, also Freight, Coolie Hire, &c.	Action taken.
			FROM GOLAGHAT MILL.			
6367	—	—	*Guizotia abyssinica*, seeds - -	10 lbs.	—	I. I. Invoice, No. 13 of 1895.
6368	—	—	*Ditto* oil - - -	20 lbs.	—	Ditto.
6369	—	—	*Ditto* oil-cake -	40 lbs.	—	Ditto.
			FROM COMMISSIONER OF SETTLEMENTS AND AGRICULTURE, CENTRAL PROVINCES.			
7621	—	—	*Guizotia abyssinica*, seeds - -	10 lbs.	—	I. I. Invoice, No. 22 of 1896.
7621A	—	—	*Ditto* oil - -	2 gallons	—	Ditto.
7621B	—	—	*Ditto* oil-cake -	20 lbs.	—	Ditto.
			FROM BELLARY, MADRAS.			
7721	—	—	*Guizotia abyssinica*, seeds - -	1 small bag	—	Ditto.
7711A	—	—	*Ditto* oil - - -	1 tin	—	Ditto.
7711B	—	—	*Ditto* oil cake -	1 bag	—	Ditto.
			FROM SURVEY COMMISSIONER AND DIRECTOR, LAND RECORDS AND AGRICULTURE, BOMBAY.			
7764	—	—	*Guizotia abyssinica*, seeds - -	10 lbs.	—	I. I. Invoice, No. 22 of 1896.
7764A	—	—	*Ditto* oil - -	20 lbs.	—	Ditto.
7764B	—	—	*Ditto* oil-cake - -	38 lbs.	—	Ditto.
			FROM DIRECTOR, LAND RECORDS AND AGRICULTURE, BENGAL.			
7982	—	—	*Guizotia abyssinica*, oil - -	20 lbs.	—	Ditto.
7982A	—	—	*Ditto* oil-cake -	53 lbs.	—	Ditto.
			FROM DIRECTOR, LAND RECORDS AND AGRICULTURE, NORTH-WESTERN PROVINCES AND OUDH.			
8279	—	—	*Guizotia abyssinica*, oil - -	14 lbs. 7 ozs.	—	Ditto.
8280	—	—	*Ditto* seeds - -	7 lbs. 12 ozs.	—	Ditto.
8281	—	—	*Ditto* oil-cake -	6 lbs. 11 ozs.	—	I. I. Invoice, No. 29 of 1897.
			FROM DEPUTY COMMISSIONER, KOHAT, PUNJAB.			
7157	—	—	*Juglans regia*, nut - - - -	10 lbs.	—	I. I. Invoice, No. 20A of 1896.
7158	—	—	*Ditto* oil - - - -	1½ gallons	—	I. I. Invoice, No. 22 of 1896.
7159	—	—	*Ditto* oil-cake - - -	10 lbs.	—	I. I. Invoice, No. 20A of 1896.
			FROM DEPUTY COMMISSIONER, KOHAT, PUNJAB.			
7160	—	—	*Oleo cuspidata*, seeds - - -	10 lbs.	—	I. I. Invoice, No. 20A of 1896.
7161	—	—	*Ditto* oil - - -	1 gallon	—	I. I. Invoice, No. 22 of 1896.
7162	—	—	*Ditto* oil-cake - -	71 lbs.	—	Ditto.
			FROM GOLAGHAT MILLS.			
6370	—	—	*Papaver somniferum*, seeds - -	18 lbs.	—	I. I. Invoice, No. 13 of 1895.
6371	—	—	*Ditto* oil - -	30 lbs.	—	Ditto.
6372	—	—	*Ditto* oil-cake -	40 lbs.	—	Ditto.
			FROM GOVERNMENT FARM, CAWNPUR.			
6440	—	—	*Papaver somniferum*, seeds - -	10 lbs.	—	Ditto.
6441	—	—	*Ditto* oil - -	2 gallons	—	Ditto.
6442	—	—	*Ditto* oil-cake -	35 lbs.	—	Ditto.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Countervailing duties in India

— 7/9/61

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